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ABSTRACT

Summarized are the proceedings of the conference (discussions, agenda, invitees), held to examine the present state of the testing and evaluation of blind and visually impaired persons. Not only tests and methods were covered, but also how evaluation procedures fit into educational and rehabilitation procedures, ethical considerations, and utilization of information obtained. Included are papers and the discussant comments on the following topics: test construction or adaption for use with the blind, personality dynamics and vocational success of blind adults, the diagnostic interview, research on perceived pleasantness - a stimulus variable in auditory projective testing, psychological factors in the evaluation of sensory aids, standard personality tests, intelligence testing of blind children, assessment of nontestable blind children, brain waves and blindness, and evaluation of the minimal brain damage syndrome in blind children. (KW)

PROCEEDINGS OF THE CONFERENCE ON NEW APPROACHES TO THE EVALUATION OF BLIND PERSONS

JUNE 1970

Proceedings of the Conference on New Approaches to the Evaluation of Blind Persons

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American Foundation for the Blind

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FOREWORD

The Conference on New Approaches to the Evaluation of Blind Persons was planned and held by the American Foundation for the Blind in order to examine and take stock of the present state of the testing and evaluation of blind and visually impaired persons.

Because evaluation and testing are of concern to a wide range of the professional personnel in the field of work for the blind, the Foundation in planning the Conference purposely took a broad view of both what constitutes evaluation and of the professional areas to be represented at the Conference. The Conference covered not only the tests and methods now available, but also how evaluation procedures fit into the educational and rehabilitation processes; the ethical considerations that must be taken into account; how much valid information can be expected from various types of evaluation procedures; and how such information can best be utilized.

By bringing together both researchers and practitioners--originators of evaluative instruments, the clinicians who use them, and the educators and rehabilitation specialists who must utilize the information obtained through evaluation--the Foundation also hoped to create an opportunity for a discussion of the aims as well as the means.

While the Conference produced no consensus, no resolution of differences, nor easy solutions to the persistent problems of testing and evaluation, it did however shed light on these problems and differences and on their causes. Moreover, it did show clearly directions in which improvements can be made.

This publication is a summary of the conference proceedings published for the information of others in the field who are studying related problems.

M. Robert Barnett
Executive Director
American Foundation for the Blind

INTRODUCTION

The Assessment of Blind Persons: The Challenge

Herbert Rusalem

Organized and systematic assessment of blind persons is a relatively recent development in education and rehabilitation. For many generations a sophisticated evaluation system was not greatly needed. When extensive evaluation was attempted, as in the case of one leading residential school for the blind, copious and elegant evaluation reports were safely locked away in shadowy file rooms, providing satisfaction for the school administration, but little practical value for the students. It was clear that the school (and its counterparts all over the United States) was not ready to implement evaluation findings in viable programs. In fact, just a few decades ago most educational and rehabilitation settings offered one or two basic service tracks to which the blind student or client adapted or was closed out as "unfeasible."

As long as stereotyped programming subjected all blind individuals to common educational and rehabilitation experiences, evaluation was superfluous. The pervasive practice was one of "shoe-horning" individuals into existing programs rather than adapting programs to fit individuals. Either the person succeeded in meeting the demands of the program or he did not. In the latter event, he had to seek elsewhere for the assistance he needed and, more often than not, it was a vain effort. In those days even the crude assessments that were available were less primitive than the service programs. At least they made some attempt to differentiate individuals and to respect their right to be different.

Major changes have occurred in recent years in the quality of services delivered to blind children and adults. A broad range of educational settings, curricula, tracks, technologies, and treatments are available to blind children, and a multitude of centers, agencies, programs, therapies, and approaches are accessible to blind adults. More than ever before, attempts are being made to provide for individuality and to adapt instruction and rehabilitation to individual characteristics and needs. Indeed, some highly sophisticated means have been devised to assist visually limited persons with widely divergent attributes and problems to attain socially desirable objectives. In many well-endowed communities the availability of numerous constructive alternatives call upon professional workers, parents, children, and clients to make relatively fine distinctions and decisions. Yet, such personal and professional action demands extensive and profound knowledge of the individual and his milieu.

In many respects the tables have been turned. Today, service programs seem to have outstripped the evaluation tools designed for them. Only recently, psychological testing has awakened from the long slumber that ensued after Samuel P. Hayes did his finest work in intelligence and achievement measurement. Now, the testing of blind children and adults is in the process of catching up as investigators turn to the use of new testing stimuli, better norming procedures, improved means of establishing validity, and newer test construction methods such as factor analysis. However, this movement is still in its early stages. Similarly, progress is being made in assessing blind individuals through work-sample and remunerative work experiences. Promising as these approaches are, they are still characterized by personalized judgments made by partially trained evaluators, inexact success criteria, doubtful norms, and questionable relevance for many life activities. Thus far, "action" evaluations are more effective in predicting performance in activities directly related to the test items than they are to predicting global functioning in social, vocational, and educational settings.

Other evaluation procedures are also on the move. Electronic tools are adding precision to the assessment of mobility capacities and time and motion factors in work situations. Improved interviewing techniques are increasingly successful in evaluating interpersonal responses. Finally, controlled and timed observations are generating useful data about individual functioning in defined settings. Despite all of these developments, both actual and promised, the evaluation of blind children and adults remains relatively inexact. For example, cross-sectional methods applied to blind individuals early in the educational and rehabilitation process do not always reveal underlying strengths, but reveal instead situational incapacities that change as service proceeds. Much of the current reliance upon work-sample and remunerative work observations has come about because professional workers realized that the fearful, uncertain, and perhaps troubled individual assessed in the clinical setting undergoes dramatic changes in the course of an extended educational and rehabilitation experience. For example, it is now being hypothesized that test results obtained on deaf-blind adults upon entry into a rehabilitation program will undergo significant upward revision after six to nine months of service in a comprehensive program designed expressly for this group. Planning based exclusively on current test findings would be inappropriate and even damaging for many deaf-blind individuals. Indeed, test results in some cases are so discouraging that rehabilitation would not be undertaken at all.

Among blind persons, as with other groups, the need is not only for appropriate measures of present functioning, but for educated estimates of potential for growth. Both educational and rehabilitation institutions initiate service at the point of present functioning, but soon come face to face with the

need to plan subsequent experiences in accord with informed estimates of growth potential. Under present conditions the assessment methods used in these settings are more effective cross-sectionally than developmentally. Repeated evaluations may help, but they are not the full answer to the dilemma. Frequent reassessments of this type create their own contaminating variables such as the growing tendency for individuals to become "testwise," develop a memory for repeated items or types of items, experience increased or decreased test motivation, and become subject to positive or negative halo effects on the part of evaluating observers. Consequently, one challenge of this Conference, and of the field of evaluation in general concerns the assessment of educational and rehabilitation development and potential.

A second challenge is that of usefulness to the practitioner. Far too much time, effort, and money are expended upon assessments that generate results that satisfy the professional evaluator, but prove less than helpful to the teacher or rehabilitation worker. Not infrequently, the assessment specialist has the best of intentions. He views his evaluative effort as having a practical purpose and as fulfilling some educational or rehabilitative objective. Yet, however well-intentioned he may be, he can become so involved in the measurement process that he fails to maintain sensitivity to the types of data that practitioners require for planning and programming. As a result, the evaluator may grind out report after elaborate report presenting data on variables that either have little relevance for practice or little meaning for practitioners. Standing well back from the day-to-day service settings, the assessor sometimes practices his craft in splendid isolation and protects his product from attack by teachers and counselors by avoiding feedback from them.

Even if the variables measured by the evaluator are relevant for program purposes, the assessment report may be written in a jargon that satisfies the writer, but befuddles the practitioner. Terminology, theoretical frames of reference, private communication systems, and unconscious obfuscation all contribute to the frustration of those who attempt to use some evaluation reports. When attempts are made to consult the evaluator about his meanings, oral communication may not be much more effective than written communication. Thus, even with highly effective instruments, the challenge of generating and sharing meaningful findings with others constitutes a recurring and, as yet, only partially solved problem.

A third major challenge in the evaluation of blind children and adults is that of continuing validation of instruments and procedures. Much evaluation terminates at the point that a written and/or an oral report is presented to the practitioner for his use in educational and rehabilitation service to people with visual limitations. Drawing the evaluation line at this point promotes one-way communication. Like the physician, some

of whose best patients die at an early age without his being aware of it, some competent evaluators do not concern themselves with the utility of their findings in the actual service situation. Yet this is where the ultimate validity criterion lies.

If the evaluation of blind persons is to move toward greater utility and relevance for education and rehabilitation, validity will need to be perceived not only as residing in constructs, logic, and internal consistency, but in practical predictive value in real-life service and community situations. For this to be accomplished, evaluators will need to bring their old and new instruments to be tested in the laboratory of everyday client and student functioning, and to involve themselves more than they have been in the observation of subjects at school, at work, and in social relationships subsequent to the termination of formal evaluation. Indeed, some exciting evaluation procedures have failed to gain generalized acceptance by educators and rehabilitation workers because the data they provided contradicted actual performance. Even if this occurs because practitioners misuse evaluation findings, or ignore them when they are dissonant with established beliefs about an individual, this error may be detected and corrected only by extensive field validation of assessment techniques and feedback from service personnel.

Finally, the challenge of the "changing" student and client population is confronting evaluators of blind children and adults as it is all who serve the blind. An increasing proportion of blind persons entering specialized services bring with them highly complex and multiple problems. Assessing such individuals calls for modifications in administration, scoring, interpretation, and application of customary evaluation procedures. Adequate knowledge is not yet available concerning the most efficacious means of making such modifications without destroying painstakingly constructed instruments, or without distorting them beyond recognition. As a result, the tendency is either to use existing instruments too rigidly with exceptional clients or so flexibly that the nature of the instrument is in doubt.

Investigators have been so fully occupied with the massive task of bringing testing and assessment up-to-date for blind persons, in general, that relatively little systematic effort has been expended on the deaf- and hard-of-hearing, mentally retarded, preschool, aged, emotionally disturbed, and cerebral palsied blind persons. Currently, a few specialists in each of these areas are using highly personalized techniques to assess educational and rehabilitation readiness. These methods should be described fully so they may be tested in a variety of settings to determine their general applicability and utility in educational and rehabilitation programming.

Although no attempt has been made to catalogue fully the challenges concerned with assessing blind children and adults, four problems have been noted, including:

1. The need for measures of development and potential;
2. The need for instruments and procedures that have practical value for practitioners;
3. The need for continuing validation in the service setting; and
4. The need for instruments and procedures that are suitable for multihandicapped and atypical blind subjects.

In bringing together the specialists participating in this conference, the planning group hoped that these and other challenges in the evaluation of blind persons would come under discussion and that suggested solutions would be offered. Any evaluation of the evaluators, then, rests upon the degree to which they came to grip with these (and other) current issues in assessment. One criterion that should be used by the reader in measuring their contribution is the degree to which the participants have recognized and dealt with the problems of assessing development and potential, providing data that are useful to practitioners, engaging in continuing field validations of assessment procedures, and developing evaluation procedures for multihandicapped and atypical blind individuals.

Test Construction or Adaptation for Use with Blind Adults

David Malikin and Saul Freedman

Diagnostic testing has long been the boon and the bane of psychological practice. It has been a boon because it early and firmly established the usefulness of psychology in coping with a myriad of human problems: educational, industrial, medical, marital, psychiatric, and vocational. Despite this usefulness, psychological testing has also proven a bane, arousing loud and passionate complaints about invasion of privacy, the stigmatizing and damaging of students, and its inappropriate use by industry as a screening device. Thus, we see the rather amazing spectacle of a rapid proliferation of testing in response to the demands of a computer-conscious society--and legislative action to curb and ban the use of tests. The experience of using psychological tests with the disabled, more specifically with the blind, has followed the same dichotomous pattern. Before examining the practice of test usage with the blind, or considering diagnostic needs for the future, it might be useful to discuss certain basic concepts around which much of the "boon or bane" dilemma seems to resolve.

A major problem of all test design is that of "norming," or the process of using reference groups as a basis for comparing an individual's test score to give it meaning. The reference group is assumed to possess and portray a wide range of behavior tapped by a particular test. An individual's performance on this test, a sample of his behavior, is then interpreted according to his placement within the group range. Normative groups vary from test to test, depending on the behavior being evaluated, so that the "norming" population for a test of mechanical ability is different in important ways from one used to measure clerical ability. In some cases, as with intelligence or personality tests, the normative data collected are supposed to be descriptive of the total population, the assumption being that everyone has some intelligence and a personality. Problems arise when a person being tested differs significantly from the normative group for a particular instrument, as, for example, when blind people are given a test designed for the sighted, the deaf a test that is dependent on hearing, or the neurologically damaged a test requiring motor coordination. This is not to say that a comparison between the disabled and the able-bodied is meaningless; rather that the test findings might ignore behavior that is far more significant than that it is capturing. A test may show what an individual can do at a given time, but often does not tell us why or show us how he does it.

A second major problem in test design centers around questions of appropriateness, validity, and predictability. One of the important functions of psychological testing is to estimate a potential for learning. The test is often expected to yield an understanding of how an individual learns, and to predict how

successfully he might undertake new learning. However, the validity of such a function depends greatly on the relevance of the test content to the way the individual learns. In using tests designed for a "normal" population, based on how people "normally" learn, a number of questions of applicability to the disabled can be raised.

For the sighted, vision serves as the integrative sense, and much of the learning process is centered about it: "A picture is worth a thousand words." Can it be assumed that the cognitive functions of the blind are the same as those of the sighted? Is it possible that the tests used for the sighted overlook the function of other senses in the learning process? Or that there may be compensatory mechanisms being used?

Similar questions can be raised about the concept of intelligence. Some definitions indicate that intelligence is revealed in the way an individual copes with his environment. Does a blind individual interact with his environment as a sighted person does? Does it matter that the early life experience of the blind is so different in important ways from that of the sighted? Are the tasks of the standard intelligence tests now in use appropriate for learning how the blind deal with their environment? Even when the tasks are adapted for use with the blind, one might question whether other test stimuli might not prove more revealing. For example, in using the verbal part of the Wechsler Adult Intelligence Scale, is it forgotten that even verbal cues are related to the images they conjure up? Can we assume that these images are similar for both the sighted and the blind?

A rather hasty review of the literature impresses one with the dearth of knowledge available about testing practices with the blind. Outside of work on intelligence tests and tests of manual dexterity, other areas seem sparse indeed. It appears that psychological testing with the blind is, at this time, a highly subjective clinical practice, the validity of which is most difficult to gauge. It may therefore prove useful to review some current diagnostic practices with the blind.

The psychologist working with blind individuals has instruments at his disposal which contribute insights regarding the person being evaluated. He contributes a body of knowledge which helps in understanding their potentials, strengths, losses, and needs so that more meaningful services might be offered them. While the instruments he employs yield scores, concentration upon scores alone may invite misinformation, inappropriate planning, and, most of all, harm to the individual being evaluated. Perhaps more important than the test score is the psychologist's clinical interpretation of the evaluee's performance and the significance it holds for the very unique person being tested. In general, psychologists have had to depend unduly upon clinical interpretations and techniques such as interviewing, due to the limitations and questionable reliability of available standard instruments for use with the blind.

The employment of skillful interviewing techniques are as essential to the psychologist as the many tests at his command. He must be ready to supplement whatever information has been obtained by the intake worker. This information is critical for the meaningful interpretation of test results. History-taking can afford many essential insights into the individual's perception of himself, his adjustments to blindness, his interpretation of his visual loss, his personal-social-economic losses to his completeness as a person, his relationships with other members of his family and friends, his degree of security regarding himself, and his attitude toward his future.

As a functioning part of a rehabilitation team, the psychologist is vitally involved in the evaluation of the individual for rehabilitation "readiness," in appraising the individual's need for adjustment training, in assessing the individual's vocational potentials, in the writing of reports, and in interpreting all of the above to the staff during a case conference. Early recognition of an individual's needs does much to insure success in a particular rehabilitation program. Insights shared with a rehabilitation counselor may contribute to the meaningfulness of the program. The identification of emotional problems allows for the planning of therapeutic intervention--often a necessary part of the rehabilitation process.

Beyond the usefulness of his interview techniques and other referring materials, the psychologist has available various tests to aid him in making a personality assessment of a blind individual. The Rotter Incomplete Sentence Blank and the Lighthouse Revision of the Rhode-Hildreth Sentence Completion Test are examples of projective instruments which have been used with some success. Some of the typical sentence completions begin: "Our family. . . , " "My eyes. . . ," "I am ashamed. . . ," "Blindness. . . ." Although the Rorschach Ink Blot Test and the Thematic Apperception Test are useful for those partially sighted individuals who have extensive residual vision, the Auditory Projective Test by Sybil Braverman and the late Hector Chevigny can be utilized with all people, regardless of degree of vision. As revised and distributed by the American Foundation for the Blind, this test, now on tape, presents scenes that parallel the Thematic Apperception Test. The subject listens to a scene spoken in an artifact language between an older woman and a young boy, an older man and a young man, an older man and a young woman, and so forth. All tonal elements of emotion are included. As in other projective tests, the person being examined is asked to develop a story based upon the stimulus presented. The second portion of this test employs the same technique, but with English spoken. The third section has sound effects such as a stormy background with footsteps entering into a house, running footsteps followed by a whistle and shots, a train with a whistle and screeching automobile brakes, and so forth. Again, a story is to be reproduced.

The Emotional Factors Inventory by Mary K. Bauman has been designed for use with a blind population. Other personality tests that can and have been employed include the Bell Personality Inventory and the Minnesota Multiphasic Personality Inventory.

The House-Tree-Persons Test has been employed to gain additional insights. Totally blind and partially sighted individuals have been tested with this instrument. While interpretations may not be as finite, the results, when part of a larger assessment battery, have justified the time invested. A further refinement of this technique came about with the use of raised line drawings, which enable the person being tested to trace what he has already drawn. The experience in administering this test to congenitally totally blind individuals is worth comment. The technique is experimental, but it would appear to offer many insights regarding the person's total organization (or lack of it), his body concepts, and valuable information relative to his general orientation. Some analyses made were especially valuable in helping to understand problems encountered in mobility and other training. The raised line drawing technique has been most useful in administering the Bender-Gestalt Visual Motor Coordination Test. The stimulus figure is presented as a raised line drawing.

Another projective technique is currently being developed by Lawrence Miller, one of the psychologists at the New York Association for the Blind. The subject is presented with blocks of clay, with the instruction to produce a human figure. Rating scales have been developed, and the results thus far appear promising in assessing the congenitally totally blind person.

Some of the above tests promise more effective evaluation of blind people, but the need for additional clinical research is obvious.

Until recently, assessment of the intellectual potential of blind people depended upon the administration of a verbally orientated instrument, such as the Verbal section of the Wechsler Adult Intelligence Scale. As a result, less verbal individuals and those who came from a different normative culture, were at a disadvantage. Shirley B. Watson developed a test for use with blind people that appeared to be influenced by Wechsler's Performance section. It employed blocks of different texture for pattern reproduction. A sphere, a hand, a cube, and a mannequin were presented disassembled for object assembly. The subject was asked to identify missing parts of recognizable objects. A pattern board with removable pegs measured recall, and the abacus was used for determining learning ability and logic. Through a Vocational Rehabilitation Administration grant, this test, now called the HISAB, was revised and validated at the Illinois Institute of Technology, under the direction of Professors Harriett and Phil Shurrager. This instrument, although limited to use with those who are totally blind, holds some promise for a more

accurate assessment of individuals who are less verbally gifted or who come from cultural backgrounds where English is not the first language.

The construction of the HISAB calls attention to the need and usefulness of specialized techniques for assessing people who are blind, beyond adapting existing instruments. In this process, however, psychologists must exercise extreme caution in assuming that in the transposition from sight to touch they do not confuse the ability to feel and touch with the ability to think. The recently introduced Stanford-Ohwaki-Kohs Block Design Test should be observed for this possible effect. Experience shows that congenitally blind individuals produce HISAB scores which correlate more closely with the verbal WAIS than adventitiously blinded adults, who perform better upon the WAIS verbal than the HISAB. This suggests that this instrument is not as relevant in assessing the intellectual ability of the adventitiously blinded because their sense of touch has not become as developed as that of the congenitally blind.

Several useful tests are available to the psychologist to appraise a prospective rehabilitant's manual dexterity. Some of these better known instruments include the Minnesota Rate of Manipulation Test, the Purdue Pegboard Test, the Pennsylvania Bi-Manual Test, the Crawford Small Parts Dexterity Test, and the Bennett Hand Tool Dexterity Test. Even for an industrial evaluation, however, it is not necessary to utilize more than two or three of these instruments--provided that those chosen furnish a sample of five-finger dexterity, gross hand dexterity, and bimanual coordination. The psychologist is able to obtain *more* than percentile ratings and a comparison of the person being examined against industrial workers. He should be able to obtain clinical insights about the capacity of an individual to incorporate directions and put them into effect, his motivation, his ability to concentrate, and his adjustments to blindness.

The utilization of one of several available occupational interest inventories is imperative. The resulting profiles may provide an understanding of the individual's unexpressed interests, and thus offer new avenues to be explored between him and his counselor into the individual's lack of interest in particular fields of work. This information might be difficult to elicit through other means since a blind person tends to stereotype himself as functioning within "blind occupations" and is afraid to express rejection of occupations he dislikes. Among such inventories are the Strong Vocational Interest Blank, the Kuder Preference Record, the Occupational Interest Inventory, the Thurstone Interest Schedule, and the Brainard Occupational Inventory. As part of a carefully selected battery of tests, the interest inventory may provide additional insights into personality variables.

A number of aptitude tests have been adapted and created for use with people who are blind. The Lighthouse Clerical

Aptitude Test Battery, formed from parts of several Psychological Corporation Tests, is useful in assessing potential success in a training program of transcribing typing. The Seashore Test of Musical Talents offers an opportunity for assessing potential for piano tuning. The Programmer Aptitude Test by J. L. Hughes and W. J. McNamara is enjoying much use following the development of a training curriculum designed to prepare blind people to be computer programmers.

Psychologists have come to recognize that blindness is but one of many factors to be considered in evaluating the makeup of an individual. Almost all of the tests available for assessment, however, are based upon models designed for a normally sighted population. While the use of such techniques might be appropriate for some blind people, they might prove invalid for others. To assess the adequacy of test instruments used as originally designed for a normally sighted population, or adopted for those who are or who have become blind, we should first consider the impact blindness has upon the total organization of the individual.

We are aware that blindness affects each person in a unique way. A person never becomes fully adjusted to his loss of vision but, rather, is in a process of making more effective adjustments to it, much as everyone, disabled or not, continually makes adjustments to a total life situation. We anticipate that the types and degrees of adjustments made to blindness are conditioned by the structure of the person's total organization even before the loss of sight, and that two people with the same degree of measured visual acuity often do not perceive in the same way.

In the creation of new test instruments, and in the adaptation of existing ones, we have failed thus far to question and explore what vital differences, if any, accrue to learning and behavior as the result of being born blind or of losing sight later in life. One approach to test design for the blind might be inferred from the pioneering work of Jean Piaget. Piaget sees intelligence as a special case of adaptation, with life a continuous creative interaction between the organism and the environment. This interaction functions outwardly as adaptive coping, inwardly as organization. Piaget refers to the outer adaptation as "accommodation" and the inner organization as "assimilation." Assimilation occurs whenever an organism utilizes something from the environment and incorporates it, dealing with the new in terms of something already familiar, such as in habit formation or conditioning. Accommodation, which is complementary to assimilation, represents the modifying effect of the environment on the coping mechanisms of the organism. Thus, the life experience is seen as a process in which the ready-made reflexive mechanisms of the infant become progressively transformed by environmental interaction, and become increasingly complex as maturation proceeds.

Piaget describes six stages of development in the formation of intelligence. The first stage (the sensorimotor) occurs roughly within the first two years of life. It consists of the initial perceptions of objects and movements from place to place. Only gradually, over a long period, does this grow into reflective intelligence (the sixth stage) which explains the relationship between things and attributes meaning to phenomena.

It is impossible, in such a brief review, to incorporate all the complicated concepts described by Piaget in the development of thought. Nor is this really necessary, since the purpose of this discussion is to remind us of how different the life experience of the congenitally blind is from that of the sighted. Consider how different from the sighted are the coping or accommodating mechanisms used by blind infants during the sensorimotor stage of development, and the impact of the early assimilation of knowledge on later perceptions and thought formation. Or, to put it another way, the blind child first experiences his environment in his own unique way; then has to reorganize much of his assimilation to learn the way the sighted perceive this environment. It might be hypothesized that the process of learning, unlearning, and relearning is extremely complicated for the congenitally blind, and that accommodation is affected at each developmental stage. In summary, then, an implication of Piaget's work is that the formation of intelligence in the congenitally blind may be different in important ways from that of the sighted, and that testing of the blind may require a uniquely different approach if we are to understand and assess a blind individual's intellectual potential.

Occupational Interest Inventories comprise another example of tests for which there is a need for a revision designed especially for the blind. The young sighted person gains much of his early vocational knowledge from observation of the working world. He visits businesses, stores and other places of work, and he sees professionals, and nonprofessionals perform their jobs. These perceptions and impressions help in forming a realistic picture of the vocational world and in relating them to his own interests. It is a fair assumption that the occupational knowledge, perceptions, and impressions of young congenitally blind people are different, if not less accurate, and much more limited in scope. The awareness of a visual handicap must also influence occupational choices for reasons other than interest alone. One must question the relevance of a large number of present-day interest inventory test items for the blind, and therefore the validity of scores obtained. Here again, a test based on the actual occupational experiences of blind individuals would seem needed as an aid to vocational counseling and planning. This trend of argument could be continued at length, for an equal case could be made for personality, aptitude, achievement, and other tests specifically designed for the blind, based on their unique life experiences.

Finally, greater recognition is needed of the fact that most individuals considered to be blind have some degree of useful remaining vision. Evaluation procedures should include an individual's appraisal of himself in the continuum of sighted-to-blind, especially since most blind persons see themselves as sighted, and behave in accordance with this self-perception. In terms of test norms this implies that three distinct populations have to be considered: the congenitally blind, the partially sighted, and the adventitiously blind.

Discussant: Simon Hoffman

With an intensive study of some few of the papers and a hurried review of all of the papers, I have been very much impressed with the level and quality of the research available to us today. And I am also impressed and hopeful about what this means in terms of the functioning of the professionals concerned with this topic.

An important developmental segment of my own career, 1948 through 1958, was concerned with developing rehabilitation programs for the blind at the New York Guild for the Jewish Blind. Initially these had strictly vocational goals and in the later years included the broader ADL--activity of daily living--goals. During the subsequent ten years, to date, as the Executive Director of the Jewish Vocational Service of Boston, my concerns have broadened to include developing rehabilitation programs serving all disabilities and in developing educational counseling, vocational planning, and employment services for so-called "normals." During this later decade, as the only noncollege admissions director serving on the college advisory board for the Massachusetts Division for the Blind, I had some continuing contact with current techniques used in evaluation of the blind. And in addition, with somewhat infrequent consultation or colleagual contact with the State VR agencies for the blind in Massachusetts, Rhode Island, and New Hampshire, and with occasional contact with a colleague at the Perkins School and two of the local Boston volunteer rehabilitation agencies programming for the blind. My remarks therefore, come from this background.

I must also identify a strong additional bias. The most respected of tests available and in use today, at very best, only measures with some significant degree what it purports to measure--this is called validity. And when this is true at all, it is true in relation to a defined norm group. The more similar the evaluee to the defined characteristic of the norm group, the more meaningful the measured response in describing the evaluee in relation to that group.

However, these very tests, with their so-called "objectivity," and necessarily standardized administration rarely permit

or give credit for, or otherwise encourage expression of, the range of compensatory response leading toward solution. Although my own doctoral training included more than the average number of courses and credits in tests and measurement procedures, I have always felt that standardized testing samples such a limited aspect of the individual's functioning. And, too often, the standardized testing has a sterile laboratory quality. It just "ain't very real." And for the same and yet other reasons it is often too anxiety producing. We know for many persons anxiety produces disorientation, distortions, confusion, and enervation rather than the integrated harnessing of resources and energy.

My bias, therefore, is in the direction of creating samples of everyday real life situations in which the evaluee can be observed and measured in terms of adequacy of functioning--with coincidental opportunity for provision of instruction in encouraging and supportive yet challenging ways that may yield some appreciation of the evaluees potential--truly the essence of our concern here today.

For testing or evaluation is for what purpose? To categorize, to slot, to discard? Well do I remember the frequency with which state rehabilitation applicants were denied service or dropped very early in service with the simple statement "not amenable to" or "unable to make use of" or "unable to profit from" rehabilitation services.

Rather, I strongly urge that the purpose must be identification of potentials for developmental training, for further education, vocational guidance, or rehabilitation planning.

An important aspect, identifying potentials, is the face of the coin. However the coin does have another side. An appreciation of the areas of limitation or obstacle in the functioning of the individual provides necessary direction for special attention, remediation, and other compensatory development.

The usual testing situation, by design, attempts to measure a unique and somewhat isolatable aspect of an individual's functioning. This contributes to my earlier description of testing as being too frequently a sterile laboratory-like situation. However, as some of the papers in this conference report, there has been encouraging growth of evaluation procedures that do sample real-life experiences.

And I have another bias. That the evaluator, whether psychologist, social worker, work instructor, or other be more than a so-called "objective" observer recording response to stimulus. I prefer to see an evaluator who is able to be differentially supporting and encouraging--differentially in relation to the needs of the evaluee.

During the last few years our professional journals have reported a number of sound experimental projects that indicate the formerly sacrosanct intelligence is made of a number of factors, at least several of which are susceptible to development and improvement with attention and training and nurturance.

That global IQ score no longer has the respect it once enjoyed.

Many tests generate a numerical score--providing an inherent tendency to perceive that score as a precise measure--and then to act on that perception.

There is still great difference of opinion regarding whether qualities measured by intelligence tests are influenced more or less by learning than by inherent potential. Whether one views a test score as providing an accurate measure of an individual's innate ability is likely to have an important effect on the use one makes of test scores. If one views a person's performance on a test as being influenced primarily by what he has learned--as opposed to his innate capabilities--then one is less likely to make long-run predictions about his ultimate success in a course, or a school, or a job on the basis of his test score. After all, his motivation might increase or his anxiety decrease and he might do better next time.

Do we really understand the potentially great impact that test scores have on one's self-estimate of ability? And how this affects the individual's aspiration level, his motivation to achieve, and his personal decisions with respect to future courses of action?

Too frequently an evaluation or appraisal or diagnosis is automatically read as prognosis--instead of merely as an assessment of a characteristic at a given time and place and under given circumstances. As a diagnosis we are more ready to agree that it is amenable to change with time, and under changed conditions, such as increase stimulation or encouraging challenge for therapeutic or educational intervention.

The confusion of diagnosis with prognosis leads to a vicious cycle. When a person is regarded as unable to learn a certain task he is excluded from certain training programs and thus deprived of the opportunity to prove himself. And the subsequent very poor performance is then regarded as bearing out the initial low estimation of his capacity.

Suppose Freddy and Jimmy are about equal in ability but their teacher thinks Freddy is brighter and therefore expects more from him. Would that make any difference in their intellectual growth? In an experiment on the West Coast, school teachers were given the names of pupils who, they were told, were expected to show rapid intellectual gains. Actually, the names had been secretly picked at random. By the end of the year IQ test showed that those who were expected to gain had indeed made far better progress than the others. This was especially true in the lower grades. Furthermore, the teachers considered these presumably brighter children more curious, appealing, affectionate, and well adjusted than the others. Youngsters who made unpredicted gains, on the other hand, were not considered to be either appealing or interesting by their teachers.

How did prediction of growth cause growth? Mainly, says the report by Rosenthal and Jacobson, because of the teacher's attitude--by what she said, by how she said it, by her facial expression, postures and perhaps by her touch, the teacher may have communicated that she expected improved intellectual performance. She may have helped the child learn by changing his self-concept, his expectations of his own behavior, his motivation.

My bias showed that I am less concerned with the possible confabulation of psychometric data than I am with involving the evaluee in a real life testing process for the purpose that makes sense and has meaning to him.

My bias gained some support from a study, reported by the Industrial Relations Center of University of Minnesota, conducted to determine whether the performance of nonhandicapped skilled clerical and nonskilled workers is more predictable than performance of similar subgroups of handicapped workers using standard aptitude measures as predictors. The results clearly indicated that the performance of the handicapped was not as predictable and support the idea that personality and motivational reaction to the disability may be more important than aptitude level in evaluating the handicapped.

The diagnostic function, if it is to have any value, must be kept dynamic. Analysis and description of individual personalities who are having adaptational difficulties must be done in functional behavioral terminology and not diagnostic labels. Too often the label summarizes a complex interrelated pattern of many different facets of response. The uniqueness of the individual can only be understood in highlighting the uniqueness of his current pattern of responding. Only in this way can we assist in planning what can be done to help. The understanding of the detailed behavioral response suggests the more effective handling and solution of the individual's difficulties in living rather than simply providing for knowledge or explanation about it.

Let us focus our concern not only on the maladaptive but also on the adaptive dimensions of the individual. The kind of approach suggested demands that our helping professionals--the psychologists, social workers and rehabilitation counselors, and others have some explicit theoretical system of personality to which they can make all of this observational and test data referrable. Another requirement, I insist, is a deep personal desire to help others and an internal security and freedom--enabling one to get involved with the client and his everyday head-knocking (as well as) crisis problems.

In testing we need items that are everyday living experience samples--items that appropriately sample pertinent reality experiences and an atmosphere that is supportive and encouraging and challenging. Our basic concern is potential for learning--whether for self-care, or for schooling, or for employment.

Our next concern is understanding how an individual learns--his use and development of his available receptors and his internal integrative and organizing ability. This is necessary in any planning with and for the individual.

1. Personality Dynamics and Vocational Success of Blind Adults

May Husni-Palacios and John R. Palacios

It was indeed our privilege to participate in this dynamic conference aimed at the diagnostic, prognostic, and rehabilitation aspects of blindness. We shall attempt to share with you here the results of years of research designed to investigate the personality dynamics and vocational success of blind adults. This research effort would not have been possible without the generous support of the Vocational Rehabilitation Administration and the American Foundation for the Blind. Credit is also due to our research colleagues Drs. Joseph Tiffin, Robert Teare, Walter Jones, and Alin Gruber.

The purpose of this paper will be to discuss the development and application of a psychological test battery "tailor-made" for use with blind adults. This battery was specifically designed to investigate the intellectual, attitudinal, developmental, and perceptual aspects of blind adults, and to relate the findings to vocational success.

This battery consisted of

1. The Biographical Data Blank;
2. The Diagnostic Interview;
3. The Sound Test (an auditory projective technique);
4. The Sentence Completion;
5. The Vocational Intelligence Scale for the Adult Blind (VISAB);
6. The Tactual Reconstruction Pegboard (TRP); and
7. The Verbal Section of the Wechsler Adult Intelligence Scale (WAIS).

Only The Sound Test and The Diagnostic Interview will be discussed in detail here.

The Sample

The sample consisted of 626 blind adults, individually tested in 19 sites located in the midwestern and eastern states. These individuals were selected on the basis of certain criteria and sampling restrictions. All subjects had to be legally blind, between the ages of 20 and 50, with blindness as the sole disability. There are some indications that the sample obtained is representative of persons who seek and receive vocational rehabilitation services (Bauman, Gruber, Jones, Palacios, and Teare, 1963).

Based on data obtained from the diagnostic interview and the Biographical Data Blank, the sample was divided into three visual groups.

1. High Vision Group. Persons in this group had a vision loss ranging from a Snellen acuity of 20/200 through 20/280. This represents a vision loss of 80 through 90 percent.

2. Mid-Vision Group. This group consisted of those individuals who had a loss ranging from 91 through 99 percent. Their Snellen acuities varied from 20/290 through "object perception."

3. Low Vision Group. This group contained those persons having only "light perception," and the totally blind.

The criterion of vocational success was determined by the Job Hierarchy Scale (Jones, 1960). This scale lists 100 job descriptions which were grouped into 31 categories. Scale values were determined from paired comparisons made by eight judges, and assigned to categories reflecting vocational achievement. Certain hypotheses were also constructed about location of employment. The employment environment and its unique demands would be expected to reflect differences in adjustment. Accordingly the sample was divided into five employment groups based on location.

1. Competitive Employment. This category refers to those jobs which are typically performed in work environments where the sighted persons predominate.

2. Shop Employment. These jobs are traditionally held by the visually handicapped in what may be called "sheltered" or subsidized work situations.

3. Agency Employment. Jobs in this category typically involve administrative or service positions within the vocational rehabilitation framework.

4. Vending Stand Employment. These jobs involve the managing of retail outlets established by law in public buildings. The individual is essentially self-employed and maintains direct contact with the public.

5. Unemployed. This category consists of those individuals who were available for employment, but who had not been employed for six months or longer prior to the date of testing.

Table 1 presents the sample breakdown by age, sex, employment group, and vision group.

Table 1

Sample Breakdown

Subject Characteristics	N
A. Age	
20-29	159
30-39	220
40-50	247
B. Sex	
Male	439
Female	187
C. Employment	
Competitive	165
Shop	233
Agency	60
Vending Stand	26
Unemployed	87
Unclassified	55
D. Vision	
High Vision	128
Mid Vision	195
Low Vision	303

Now let us examine briefly the test battery for rational and predictive efficiency.

1. *The Biographical Data Blank* is an objective, fact-finding check list containing relevant personal history information such as degree of blindness, age of onset of blindness, marital status, family background, educational level, rehabilitation training, a complete history of employment, and job description.

The sample was then divided into the upper one third and lower one third on the basis of the Job Hierarchy Score of each subject, this being the major criterion against which the weighted Biographical Data Blank was validated. As a result, 13 of the original 29 biographical items demonstrated a high degree of predictive validity for generalized job success and achievement. These include (1) race, (2) weight in pounds, (3) marital status, (4) military service, (5) educational level, (6) degrees earned, (7) attendance at a school for the blind, (8) home location, (9) father's occupation, (10) training and background, (11) ability and proficiency in reading braille, (12) reading for recreation or business

purposes, and (13) percent of vision loss. An administration and scoring manual has been prepared for the Biographical Data Blank (Teare and Rhode, 1964).

2. *Vocational Intelligence Scale for the Blind* (VISAB) (Jones, 1959, 1963). This test is designed to tap the ability of blind adults to deal with abstract relationships on a nonverbal level. It is, in essence, a test of nonverbal intelligence. The items on this test consist of four geometric figures, three of which are related to one another in some manner. The subject is asked to inspect the forms tactually and indicate which figure is least related to the others. This test is easily administered, is highly reliable (Internal Consistency Reliability $r = .91$), is objectively scored, and has demonstrated predictive validity. A correlation coefficient of .63 was obtained between the verbal WAIS and the VISAB. This coefficient is in keeping with the findings in the literature when verbal and nonverbal tests of intelligence are compared; therefore it can be assumed that the VISAB is measuring a facet of intelligence. This instrument has also demonstrated significant relationships with job hierarchy scores, employment criteria, salary, and supervisory ratings of industrial workers. In summary, the VISAB, a test of nonverbal intelligence, has demonstrated construct as well as predictive validity. Table 2 presents the VISAB and WAIS validity coefficients against employment criteria groups, job hierarchy, gross salary, and supervisor's ratings.

Table 2

VISAB and WAIS Validity Coefficients (Jones, 1963)

Criterion	N	*VISAB*		*WAIS*	
		r_{bis}	r	r_{bis}	r
Employment groups					
Competitive vs. unemployed	200	.49[a]		.63[a]	
Competitive vs. shop	350	.52[a]		.66[a]	
Shop vs. unemployed	280	-.05		-.05	
Gross salary	457		.40[a]		.45[a]
Job hierarchy scale	457		.41[a]		.56[a]
Supervisory ratings					
St. Louis	52		.45[a]		.37[a]
Chicago	31		.45[a]		.37[a]
New York: A	35		.42[a]		.29
B	23		.69[a]		.21
C	11		.46		-.08

[a] $p = .01$. [b] $p = .05$.

In view of these findings it would seem logical that the WAIS and the VISAB, when used together by the counselor, yield more nearly complete and meaningful measures of the intellectual functioning of the blind adult. Used together, these instruments will provide information which is highly useful in rehabilitation, selection, and placement of the blind adult.

3. *The Tactual Reconstruction Pegboard* (TRP) (Gruber, 1959, 1963). The rationale underlying the development of the TRP is the fact that the blind worker, out of necessity, substitutes tactual perception for visual perception in performing a job. Touch is used to identify, discriminate, locate, and perceive relationships in an employment situation. The effectiveness, efficiency, and speed of tactual performance is of paramount importance to the adult worker.

The TRP measures a combination of tactual perception, manipulative skills, and psychomotor coordination. The test is easily administered and is objectively scored. Standard administration of the reconstruction test requires the subject to reproduce six patterns on a given pegboard. The reproductions are scored for accuracy of the figures, accuracy of location on the board, and speed of construction.

The results indicate the consistent superiority of the TRP over measures of verbal skills in predicting success in certain types of industrial jobs.

4. *The Sentence Completion Test* (SC) (Teare, 1964) consists of a series of 43 unfinished sentence stems. Each stem presents a dilemma or conflict situation common to everyday life. Many of the stems deal with problems unique to blindness. The task of the subject is to complete the sentences in a manner which seems most appropriate to him. His approach and his resolution of each dilemma give some indications of his problem-solving ability, his handling of conflict situations, his emotional control, and his tension reduction techniques. The clinical value of such an instrument in identifying problem areas is very high.

The dilemmas presented in the SC cover conflicts and problems in (1) peer relationships, (2) environmental interaction, (3) authority figures, (4) family relationships, (5) heterosexual interaction, and (6) relationships with friends.

The scoring system involves the classifying of responses into categories which describe the tension reduction approach taken by the subject.

Seven such categories have been isolated and defined. These are (1) positive reconciliation of the conflict or dilemma, (2) dominant-autistic, (3) hostile, (4) internalized-introjection, (5) submissive, (6) nonactive withdrawal, and (7) avoidance. The reliability of the scoring system is indicated by an over-all 84.5 percent agreement among three judges who scored 2,100 responses.

The results of the analysis indicate that positive reconciliation, hostility, submission, and nonaction differentiated significantly among the employment groups. A multiple *r* of .342 was obtained between the SC composite score and the Job Hierarchy Scale.

5. *The Sound Test.* An auditory projective technique (Husni-Palacios, 1959; Husni-Palacios and Palacios, 1963, 1964; and Husni-Palacios, 1964, 1967).

Both theory and empirical findings suggest that the processes of perception and projection are closely related to the personality dynamics of the behavior of the perceiver. Perception has been defined and understood as a response of living organisms to their environment by way of integrative organization of what the environment has to offer. Perception is a restructuring of the field in a manner meaningful to the perceiver. Therefore, perception is not a passive process of registration, but an active process of integration between the organism and his environment. Since perception is an "active integrative process with personal adaptive qualities" (Kline, 1951), the blind subject's responses to auditory stimuli may lend some insight into his private world of feelings and meanings. A blind individual depends to a great extent on auditory cues to make his environment meaningful and to experience the world around him. Auditory cues help him restructure his life space in relating to himself and to others. It appears logical that this life space organization can best be studied through the auditory sense and by the analysis of the blind subject's responses to common auditory cues.

It is Arieti's contention (1955, p. 250) that "auditory perceptions are less primitive than the visual ones, and are more apt to be used first when thought processes regress to a perceptual level." Because of the tremendous importance that language plays in human thinking, auditory images are almost always present even when visual images occupy the predominant role. Lazarus and his colleagues (1951) stated that auditory stimuli offer an ideal medium for studying perceptual effects. The temporal sequential nature of auditory stimuli makes them unique for further exploring the response to stimulus ambiguity, expectancy, and perceptual accuracy. Lerea (1961, p. 229) investigated figure-ground relationships through the use of auditory stimuli. He defined figure-ground perception as being "fundamental to all organized sensory behavior, and has reference to the process of selectively abstracting central salient sensations (figure) from the multitude of less relevant stimuli (ground) both impinging upon a sensory system."

Although the majority of projective techniques now available utilize the visual sense, the auditory sense modality has not been completely overlooked. Skinner (1936) developed the "verbal summator" for the purpose of studying latent speech. Shakow and Rosenzweig (1940) renamed Skinner's instrument the

"tautophone" and proceeded to use it as a diagnostic technique. Davis and Murray (1955) described the Azzageddi test as an instrument designed to measure personality traits. Stone (1950), Ball and Bernadoni (1953), Braverman and Chevigny (1955), and Wilmer and Husni-Palacios (1952, 1953), all have used verbal and nonverbal sound segments as auditory projective stimuli. The content of these various test materials includes such sounds as music, crowds, nonverbal human sounds, birds, dialogues, and the like. The subjects are instructed to give their ideas and feelings, or in some instances to tell stories, in response to the auditory stimuli. In most instances, the scoring of the above techniques is at the experimental research level (Lebo and Bruce, 1960).

Since such a variety of auditory stimuli are utilized in the above-mentioned instruments, a study by Husni-Palacios and Baker (1959) was undertaken to investigate the relative projective productivity elicited by different sound segments. Projective productivity was defined in terms of "units of thought" and a "transcendency index." The results of this study indicate the superiority of human and mechanical interaction sound segments over (a) human sound alone and (b) mechanical sound alone.

The Sound Test, which consists of a series of 15 sound segments depicting interactions between human and mechanical sounds common to everyday life situations, is scored in a way that allows for the assessment of the effect of perception upon personality. In past research (Witkin, Lewis, Hertzman, Machover, Meissner, and Wapner, 1954; Witkin, Dyk, Faterson, Goodenough, and Karp, 1962) it has been found that consistent modes of perception can be placed upon a continuum, based on the degree to which external cues affect individual perception. Witkin has labeled the polar extremes of this continuum field-dependent and field-independent. Subjects who are influenced by background environmental cues in perceptual tasks are called field-dependent, while subjects whose perception remains relatively unaffected by these cues are labeled field-independent. Field-dependency has also been found to be associated with an inability to function independently of environmental support, an absence of initiating activity, and a readiness to submit to forces of authority. Field-independency, on the other hand, has been found to be associated with an ability to function with relatively little support from the environment, a capacity for mastery over social and other environmental forces. These two contrasting patterns are interpreted by Witkin and his colleagues (1962), as part of their developmental theory of perception, which is based upon the concepts of differentiation and integration:

Development toward greater differentiation involves progress from an initial relatively unstructured state, which has only limited segregation from the environment, to a more structured state, which has relatively definite boundaries, and which is

capable of greater specificity of function. Though the development of differentiation and the development of integration proceed together in closely interwoven ways, the achievement of a high level of differentiation carries no necessary implication as to effectiveness of integration, adequacy of adjustment, or degree of maturity. . . .

In other words, the field-independent individual who is capable of a high degree of differentiation is not necessarily well adjusted unless he is also capable of integration. Degree of differentiation and degree of integration must both be scored to have a full picture of the individual. Accordingly, the scoring categories of the Sound Test have been so devised that an assessment of both of these dimensions is possible. Briefly, the categories are number of units of thought, concept formation, parts of the sound segment responded to, degree of integration, and degree of personal identification with the stimulus situation.

Reliability

It is not enough that the scoring schema give a complete and meaningful profile of the individual; it is also necessary that the scoring categories be reliable. Three qualified clinical judges and the author scored two complete protocols. A reliability coefficient of .83 was obtained. The author also rescored twenty randomly selected protocols three weeks after the first scoring. The reliability correlation coefficient was .93. The reliability of the scoring system is high enough to indicate that the scoring categories are objectively defined.

Administration

The 15 sound segments of the Sound Test are recorded on a 33-1/3 rpm disc, and range in length from 20 to 50 seconds. It takes approximately 30 minutes to administer the entire test. The following instructions are read to the subjects:

Here I have sounds, all kinds of sounds, and I am going to play them to you one at a time. I will stop the machine after every sound. When I stop, I want you to tell me what the sound reminds you of, what it brings to your mind, what it makes you think of and, if you wish, you may tell me a story. Are you ready?

The sound segments are played one at a time, starting with sound number 1 and ending with number 15. The subject is given ample time to verbalize his responses, which are recorded verbatim, either by hand or on a tape recorder. No new ideas, interpretations, or concepts are suggested to the subject; the examiner merely accepts what is said by saying "uh-huh" or "That's fine." Statements such as "Can you tell me more?" "That's fine, anything else?" or repeating the content of the

subject's last sentence--for example, "A splashing brook?"--may be used to encourage the subject to associate and verbalize further. However, only the initial response is scored; nothing after the examiner's first comment is scorable.

The following is a list of the 15 sound segments, defined in terms of their physical components or parts:

1. Water, music (two parts)
2. Group of people laughing, man and woman talking (two parts)
3. Liquid running (water) (one part)
4. Two men talking, bird sounds in the background (two parts)
5. Bell or clock striking, crowd of people (two parts)
6. Babies crying, bird sounds in the background (two parts)
7. Train, people, and traffic sounds (three parts)
8. Music (organ), man talking (reading) (two parts)
9. Man and woman talking (arguing), mechanical sound in the background (car) (two parts)
10. Man calling "help," crowd cheering (two parts)
11. Woman humming (singing), baby crying (two parts)
12. Person walking, opening and closing doors, running (three parts)
13. Man talking (reprimanding), child sniffling, talking (two parts)
14. Man whistling, woman humming, man saying "shut up!" (three parts)
15. Moaning and groaning sounds (of humans) (one part)

Scoring Categories

The rationale underlying the scoring system was derived in part from the field of perception and personality, and from standard systems now available for scoring the Rorschach and the TAT (Witkin *et al.*, 1954, 1962; Holtzman, 1961). Several criteria played an important role in the formation of variables for the scoring system: Any given response was scored by all scoring variables. The scoring variables were reliable. They had to be meaningful and pertinent to the study of personality through perception.

With the above requirements in mind, five major scoring categories were isolated and defined. (Examples are presented to serve as a guide to the scoring technique in the manual, Husni-Palacios, 1964.) Only the initial response of the subject is scored.

I. *Units of Thought*

This category consists of merely counting the number of "units of thought" in each response. A "unit" is defined as a minimal verbal statement expressing an independent thought or communication. However, if two thoughts are dependent upon

one another to be understood, then they are considered as one unit. This may include restatement of the same idea, synonyms, or continuation of the same thought. The latter category is concerned with two types of responses. The first is the subject's attempt to extend the original thought, and the second comprises those instances in which the subject goes on to illustrate the original concept. Other types of verbalization which are not considered units in and of themselves are false starts, repetition, incomplete speech, and defensive or stalling statements.

II. *Concept Formation*

The category of concept formation is divided into four parts: (1) definitive, (2) multiple, (3) uncertain, and (4) rejection. These parts are mutually exclusive; in other words, it is impossible for a response to receive more than one score.

1. Definitive. A definitive response is one that is stated in a clear, positive, and definitive manner, with no uncertainty or hesitancy expressed. The details of the response do not have to be too explicitly stated, just so the main, overall concept is clear.
2. Multiple. A multiple response is also clearly stated; in this response, however, more than one concept is associated with a given sound segment.
3. Uncertain. An uncertain response is one that suggests confusion, lack of certainty, and haziness. Quite often, this type of response is prefaced by statements such as, "I really don't know, but. . . "; "kind of hard to figure it out"; "To tell you the truth, I am not sure, but. . . "; and the like.
4. Rejection. This category indicates the subject's refusal to deal with the stimulus. When a subject rejects the sound segment, no other scoring of the response is possible. If there is even a minimal reference to any part of the segment, it cannot be scored as a "rejection."

III. *Part of Sound Responded to*

As indicated previously, each of the 15 sound segments is defined in terms of its components, and this category deals with the components to which the subject responds. Again the scoring is in four parts. The subject can respond to (1) all parts of the sound (W), (2) all parts by inference, but with sharpening of a detail (D/W), (3) a detail or part (D), (4) the whole sound by inference only (I). All 15 sounds are divided into their parts on the scoring sheet to simplify the scoring of this category.

1. Response to all parts of the sound (W). Any response which directly makes use of all the defined parts of the sound segment receives a W score. This holds true even if all the parts are listed or described.
2. Response to the whole, but sharpening of a detail (D/W). This category indicates the sharpening of a detail with the remaining parts of the sound as a background. In other words, one part is responded to directly, while the other parts are only responded to through inference.
3. Response to a detail only (D). When only one part of a sound segment is directly mentioned, while the other parts are ignored, the response is scored D.
4. Response by inference only (I). This category indicates that the sound segment is only responded to through inference. None of the defined parts are mentioned directly. Free association, interpretation, and irrelevant responses fall in this category.

IV. *Integration*

In this category attention is focused on the ability of the subject to bring together the diverse parts of the sound segment into a meaningful whole. Once again there are four mutually exclusive subcategories: (1) integrated responses with five or more descriptive details, (2) integrated responses with less than five details, (3) attempts to integrate, and (4) inability to integrate.

1. Integrated response with five or more details (integrated with D's). If the subject gives five or more pertinent details which enhance the meaningfulness of the response, it is scored in this subcategory. These details can convey attitudes, ideas, relationships, descriptions, etc. The number of details is not just the total "units of thought" (see page 27) in a response, rather only those units of thought that are used to embellish a meaningful concept. Therefore, it is possible for a subject to give a multiple response with seven units of thought, and yet have neither concept integrated with five or more details.
2. An integrated response with less than five details. Integrated responses with less than five supporting details fall into this category. This implies the attributing of meaning to the sound segment, and reporting few details and relationships.
3. Attempts to integrate. This category indicates a lower degree of integration. The subject tries to gather his responses into a meaningful whole, but does not fully succeed. Even though integration is lacking, the subject goes beyond a pure description of the sound and responds with some association.

4. Inability to integrate. The subject is unable to integrate the parts of the sound segment into a meaningful response. As a result, the response might be purely descriptive or one of just naming the separate elements of the sound with no effort to integrate them into a meaningful concept.

V. *Identification*

This category refers to the degree that the subject identified with the stimulus situation. The three mutually exclusive subcategories are: (1) direct personal identification, (2) controllable distance, and (3) life situation.

1. Direct personal identification. A response is scored in this category when the subject relates a personal experience, states directly his personal feelings about the situation, or is directly involved in the sound segment.
2. Controllable distance (distance). The concept of "psychological distance" is referred to here. This means that the subject places the situation either at a great distance, temporal or physical, from himself, or in an unreal context such as radio programs or the plot of a book.
3. Life situation. Any response not indicating personal identification or distance is scored as a life situation.

Validity

Three criteria were used to establish the validity of the Sound Test as a predictor of vocational achievement. The criteria were (1) job hierarchy, (2) employment groups, and (3) intelligence.

To obtain a measure of the employment level, 31 job classifications were defined in terms of work elements (Jones, 1960). Each of the 451 subjects was given a job hierarchy score corresponding to the job classification in which his position belonged. Table 3 presents the intercorrelation matrix of the Sound Test scoring categories and the job hierarchy scores.

Table 3

Intercorrelation Matrix of Sound Test and Job Hierarchy

	I	II	III	IV	V	VI
I Units of thought	-	-.225	.458	.884	.456	.364
II Concept formation		-	-.023	-.134	-.222	-.060
III Location			-	.344	-.073	.162
IV Integration				-	.389	.323
V Identification					-	.173
VI Job hierarchy						-

The correlations of the units of thought and integration are significant beyond the .01 level. It is interesting to note that job hierarchy is also significantly related to the Location and Personal Identification scores.

The second criterion used employment groups. The subjects were placed into four employment areas: (1) Competitive (jobs typically performed in work environment populated primarily by sighted adults); (2) Shop and Vending (jobs performed in sheltered or subsidized work situations where the workers are primarily blind adults, and those managing retail outlets established by law in public buildings); (3) Agency (jobs involving administrative or service positions within a vocational rehabilitation framework); (4) Unemployed (have not been employed for six months or more prior to testing).

The results of the analysis of variance are presented in Tables 4, 5, 6, 7, and 8. All categories except Concept Formation differentiate significantly between the employment groups. The results indicate that the Agency and Competitive groups can be characterized as Field-Independent. They are capable of a higher degree of integration and differentiation, and can function with minimal structure and support from the environment. The Shop, Vending, and Unemployed groups can be characterized as Field-Dependent. They are less capable of integrating and differentiating the stimulus situations, and they require structure and support from the environment. (For a more detailed analysis see Husni-Palacios, 1959; Husni-Palacios and Palacios, 1964.)

A correlation of .405 was obtained between the WAIS verbal score and the Units of Thought. This correlation is sufficiently high to indicate a positive relationship. It is also reasonable to assume that the Units of Thought is predicting a source of variance not measured by the verbal aspects of intelligence.

Discussion

In discussing the results and implications of the five scoring categories it seems to be more meaningful to talk about the whole response pattern configuration than to report isolated points in the pattern. The obtained response patterns show some similarity to Witkin's patterns of differentiation and field-dependency. The individual who is characterized as field-independent is described as being more capable of functioning with relatively little support from the environment. He can initiate and organize activities, and can struggle for mastery over environmental forces. He is also described as a person who is not satisfied with minimal success, but rather one whose resources are being overtaxed by complex personal relationships and by coping with a complex and relatively unstructured environment.

Table 4

Analysis of Variance of Units of Thought and Employment Groups

Source	*df*	*MS*	*F*
Employment groups	3	77.056	20.967[a]
Error	447	3.676	

Table 5

Analysis of Variance of Concept Formation and Employment Groups

Source	*df*	*MS*	*F*
Employment groups	3	.063	1.40
Error	447	.045	

Table 6

Analysis of Variance of Location and Employment Groups

Source	*df*	*MS*	*F*
Employment groups	3	.681	7.60[a]
Error	447	.083	

Table 7

Analysis of Variance of Integration and Employment Groups

Source	*df*	*MS*	*F*
Employment groups	3	1.90	22.093[a]
Error	447	.086	

Table 8

Analysis of Variance of Identification and Employment Groups

Source	*df*	*MS*	*F*
Employment groups	3	.239	3.144[b]
Error	447	.076	

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[a] $p \leq .01$.

[b] $p \leq .05$.

In dealing with the Sound Test, the Outside and Agency samples exhibited dynamics similar to the field-independent pattern as described by Witkin. The Outside and Agency groups are capable of organizing and integrating stimulus situations, they are more capable of coping with a complex and relatively unstructured problem, and their responses are indicative of an active coping with the presented stimuli. The inner resources of the Outside group seem to be more available, as evidenced by their ability to relate personal experiences, ideas, feelings, and attitudes. Productivity and effectiveness of integration of ideas is characteristic of the Outside and Agency groups.

The Shop sample is somewhat similar to Witkin's field-dependent configurational pattern. The individual who is characterized as field-dependent demonstrates a limited ability to impose structure and organization on stimulus material. He tends to depend on environmental support for adequate functioning. He is less capable of initiating and organizing activities, and has a tendency to submit to forces of authority. Witkin goes on to emphasize that the passive pattern of interacting with the environment also suggests a poverty of inner life characteristic of a person who is permitted easy patterns of adaptation to the environment.

In general, the Shop sample member seems to be satisfied with a lower degree of abstraction, differentiation, and integration. He is less capable of producing appropriate and adequate response to the whole sound with well-articulated and defined concepts. This criterion group seems to have some difficulty in expressing feelings, attitudes, and personal experiences when dealing with the sound segments. They also seem to be stimulus bound, capitalizing on details, in rendering their responses meaningful. This group is less responsive to stimuli coming from the environment, and they show a narrowing of social and emotional contacts.

The Unemployed sample members seemed to exhibit a higher degree of the field-dependency characteristics than that observed for the Shop sample. Their responses to the sound segments were very short and constricted, exhibiting little or no effort to structure or organize. They seemed unsure of what they heard and did not experience a firm grip on their percepts. The individual in the Unemployed sample tends to reduce the sound segment into its simplest components, thus listing its parts with little effort toward organization and integration. His percepts were hazy, in flux, and the stimulus situations seemed to overwhelm him. This group is less able to perceive affect as an important part of life situations. They tend toward inactivity and passivity rather than toward more active and assertive forms of behavior. There is a marked decrease of productivity and an impoverishment of inner resources.

Summary

It is quite evident that the three employment criterion groups show systematic differences in perception. The blind adult who has achieved a certain level of social, economic, and vocational independence, as evidenced by his ability to hold a job in competitive industry, seems to be capable in organizing and experiencing the world around him. His percepts are clear, reality oriented, and meaningful.

The blind adult working in a sheltered shop situation is satisfied with minimal success and can function adequately when the environment is structured for him. He is not so capable of differentiating his environment, nor of coping with it. His percepts are stimulus-bound, reflecting his need for structure and support.

The unemployed blind adult seems to be quite helpless and passive in experiencing the world about him. His dependency and the need for structure are very well portrayed in his perceptual performance. These perceptual characteristics reflect the quality and manner in which the blind adult experiences his surroundings, how he perceives and utilizes his abilities, and the manner in which he relates to other people. According to current theories of perception these patterns are consistent and they permeate all aspects of the person's behavior, such as his emotional, social, intellectual, and vocational functioning.

Discriminant Analysis

Each of the instruments described above has demonstrated a certain degree of predictive validity when job hierarchy and employment criteria were used as indicators of vocational success. It was thought highly desirable to develop a psychological profile which would combine the qualitative and quantitative variables, to describe adequately the several employment groups, and to isolate those variables that are related to vocational success and achievement. Knowledge of these variables would be of theoretical and practical value in the field of rehabilitation.

With the above purpose in mind, discriminant analysis was utilized to isolate and develop weights of those variables that have the mathematical properties of maximally separating the employment groups.

A random sample of 419 subjects was drawn from the total population for the discriminant analysis. This sample had complete data on all variables utilized. Subjects in this sample were divided into three criterion groups as follows: (1) Sheltered Shop (N = 163); Competitive Industry (N = 188); and Unemployed (N = 68). The variables used for discriminant analysis were age, educational level, percent vision loss, percent of life blind, age of onset of blindness, marital status, race, and scores on the TRP, WAIS, and the Sound Test.

Using all the above variables, and the three criterion groups, the subjects were correctly classified 74.4 percent of the time. However, the Unemployed sample could not be significantly discriminated from the Shop or the Competitively employed. This could possibly be due to the small sample size and to the multiplicity of the variables contributing to unemployment. Consequently, discrimination was attempted between the Shop and the Competitively employed persons. The sample was then randomly divided into a primary and a hold-out group for purposes of cross validation. The results indicate that on the basis of the WAIS score alone 75 percent of the subjects were correctly classified.

	Primary Sample		*Hold-out Group*	
	Shop	Competitive	Shop	Competitive
Shop	68	17	63	15
Competitive	27	64	31	66
% error	25.0		26.3	

It was found that the optimal linear discriminant based on all variables did no better, from the viewpoint of correct classification, than did the function based only on the WAIS score. It would appear that verbal intelligence as measured by the WAIS is a very important variable in vocational success, and that this relationship is linear.

The application of discriminant functions in this study was made in the hope of achieving increased understanding of the behavioral correlates of blindness and their relationships to functioning efficiency. But linear relationships alone did not yield the complete picture, especially when differentiating and describing the Unemployed sample. Certain patterns of behavioral scores are not linearly related to the criterion groups. Therefore, a method of configurational analysis may be used to generate the psychological profiles describing the personality, attitudinal, perceptual, and intellectual functioning of the sample.

Bibliography

Arieti, S. *Interpretation of Schizophrenia.* New York: Brunner, 1955.

Ball, T. S., and Bernadoni, L. C. "The Application of an Auditory Apperception Test to Clinical Diagnosis," *Journal of Clinical Psychology*, 9:54-8 (1953).

Bauman, K. M., Gruber, A., Jones, W. R., Husni-Palacios, May, and Teare, Robert. *Correlates of Adjustment to Vision Loss. A Symposium.* Wichita, Kansas, 1963.

Braverman, S., and Chevigny, H. *Auditory Projective Test.* New York: The American Foundation for the Blind, 1955.

Davis, A., and Murray, H. A. "Preliminary Appraisal of an Auditory Projective Technique for Studying Personality and Cognition," *American Journal of Orthopsychiatry,* 26:543-4 (1955).

Gruber, A. *The Development of a Reconstruction--Form Tactual Test for Use with the Adult Blind.* Unpublished doctoral dissertation. Purdue University, 1959.

Holtzman, W. H., Thorpe, J. S., Swartz, J. D., and Herron, E. W. *Ink Blot Perception and Personality.* Hogg Foundation for Mental Health. Austin: University of Texas Press, 1961.

Husni-Palacios, May. *Clinical Use of the Sound Test with Blind Adults.* Master's thesis. Purdue University, 1959.

Husni-Palacios, May, and Baker, L. M. *A Study in Auditory Projection.* Unpublished manuscript. Purdue University, 1959.

Husni-Palacios, May, and Palacios, J. R. "Auditory Perception of Personality Patterns of Blind Adults," *Journal of Projective Techniques,* 28(3):284-92 (1964).

Husni-Palacios, May. *The Sound Test: An Auditory Projective Technique.* Administration and Scoring Manual.

Husni-Palacios, May, Palacios, J., and Gibeau, P. "Auditory Perceptual Patterns of Process and Reactive Schizophrenics," *Journal of Projective Techniques,* 1967.

Jones, W. R. *The Development of a Nonverbal Tactual Intelligence Scale for the Adult Blind.* Unpublished doctoral dissertation. Purdue University, 1960.

Klein, A. S. "The Personal World Through Perception." In R. R. Blake and G. V. Ramsey (eds.). *Perception: An Approach to Personality.* New York: Ronald Press, 1951.

Lazarus, R. S., Erikson, C. W., and Fonda, C. P. "Personality Dynamics in Auditory Perceptual Recognition," *Journal of Personality,* 19(58):113-22 (1951).

Lebo, Dell, and Bruce, Roselyn S. "Projective Methods Recommended for Use with the Blind," *Journal of Psychology* 50:15-38 (1960).

Lerea, L. "An Investigation of Auditory Figure-Ground Perception," *Journal of Genetic Psychology,* 98:229-37 (1961).

Shakow, D., and Rosenzweig, S. "The Use of the Tautophone (Verbal Summator) As an Auditory Apperceptive Test for the Study of Personality," *Character and Personality*, 8:216-26 (1940).

Skinner, B. F. "The Verbal Summator As a Method for the Study of Latent Speech," *Journal of Psychology*, 2:71-107 (1936).

Stone, D. R. "A Recorded Auditory Apperception Test As a New Projective Technique," *Journal of Psychology*, 29:349-53 (1950).

Teare, R. J. *The Sentence Completion Test*. Manual. 1964.

Teare, R. J., and Rhode. *The Personal History Survey*. Manual. 1964.

Wilmer, H. A., and Husni, May. "Auditory Projective Technique for Psychiatric Research," *Journal-Lancet.*, 1952.

Wilmer, H. A., and Husni, May. "The Use of Sounds in a Projective Test," *Journal of Consultative Psychology*, 17:377-83 (1953).

Witkin, H. A., Lewis, H. B., Hertzman, M., Machover, Karen, Meissner, P. B., and Wapner, S. *Personality Through Perception*. New York: Harper and Brothers, 1954.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, F. R., and Karp, S. A. *Psychological Differentiation: Studies of Development*. New York: Wiley, 1962.

2. The Diagnostic Interview

May Husni-Palacios and John R. Palacios

In a clinical setting it is frequently necessary to secure information that can be obtained only by using an interview. The interview method has often been subject to criticisms leveled at its subjectivity, lack of predictive validity, questionable reliability, and the like. Yet, it continues to be widely used, is subjected widely to research, and forms a standard part of any evaluative battery, whether for diagnostic evaluation, job placement, or rehabilitative work-up (Campbell, Prien, and Brailey, 1960; Burroughs, 1958; Dudek, 1963).

Our diagnostic interview was constructed to probe certain areas of adjustment applicable to an adult blind population. Sixty-eight open-ended questions, designed to elicit information in the areas of perception of blindness, religiosity, tension reduction mechanisms, travel and locomotion, family adjustment, work history and employment potential, and interpersonal interaction dynamics, were administered to the study population. Table 1 presents the sample breakdown.

Table 1

Breakdown of the Sample by Employment Categories, Sex, Degree of Vision, Age-at-Onset, Race, and Marital Status

Employment	*N*
Competitive	156
Shop	195
Vending/agency	72
Unemployed	87
Job hierarchy	
High	141
Median	126
Low	216
Sex	
Male	370
Female	170
Degree of blindness	
High vision	105
Mid vision	162
Low vision	258

Table 1 (Continued)

Age-at-Onset	*N*
Birth to 11 months	205
One to five years	52
Six to eighteen years	111
Nineteen years and over	172
Race	
White	409
Nonwhite	131
Marital status	
Married/widowed	304
Single	176
Divorced/separated	58

Two scoring techniques were then developed so that the information obtained from this instrument would be maximally utilized.

a. Content Analysis: aposteriori content categories were developed for each of the interview items, and all protocols were submitted to content analysis. Since this instrument was designed specifically to gain information in certain areas, the items were grouped together to form the seven adjustment continua listed above. This type of analysis will yield a descriptive picture of the type of responses obtained from the sample. The total sample was then broken into 21 criterion groups for a more detailed and descriptive analysis. These are

1. Sex
   a. Male
   b. Female
2. Employment Groups
   a. Competitive
   b. Shop
   c. Unemployed
   d. Agency and vending
3. Job Hierarchy
   a. High job placement
   b. Middle job placement
   c. Low job placement
4. Degree of Blindness
   a. High vision group
   b. Middle vision group
   c. Low vision group

5. Age-at-Onset of Blindness
   a. Birth to 11 months
   b. One year to 5 years
   c. Six years to 18 years
   d. After age 18
6. Race
   a. White
   b. Nonwhite
7. Marital Status
   a. Married/widowed
   b. Single
   c. Divorced/separated

The results of the content analysis are presented in percentages, and only the highlights of these findings will be discussed in this paper. (A detailed description of the total sample, with numerous tables, can be found in the *Interview Manual*, Husni-Palacios, 1964.)

Approximately 48 percent of the sample were totally blind; 52 percent had some remaining vision, and 70 percent were males and 30 percent were females. The mean age was 36.3 years.

Perception of Blindness

The attitude of the blind adult toward his handicap and his way of perceiving this disability were investigated by asking such questions as "Would you like to tell me how you lost your vision?" "How much remaining vision do you have now?" "What do *you* feel was the cause of it?" "Do you feel anything can be done to improve it?"

Interesting sex differences were noted in the analysis. Thirty-four percent of the females said that blindness was the result of a congenital condition, while only 24 percent of the males gave this response. More males lost their vision through accidents (18 percent vs. 8 percent of the females).

When the questions were phrased to elicit a subjective evaluation of causes, degree of vision, and perceived changes in vision, more ambivalence, generalized guilt, and anxiety regarding blindness came into focus. Realistic acceptance of blindness, stability of visual loss, travel adequacy, feelings of guilt, and anxiety seemed to be related to functioning efficiency, as measured by job hierarchy and employment criteria, marital status, and socioeconomic levels. The cultural roles imposed on males and females would account for some of the differences found in dependency, independent travel, and functioning efficiency. There was a direct relationship between the verbalized need for financial assistance and the feelings of self-sufficiency, and the ability to secure and hold a job.

Religiosity and Religious Conflicts

It was felt that attitude toward religion might be indicative of over-all social adjustment. In this sense, either extreme religious preoccupation or rejection of religion might be viewed as deviating from societal norms, centering around an acceptance of religion as an important area in life. Subjects were questioned about their church attendance, the importance of religion in their lives, what it was about religion that they felt helped them most, and about the types of things they considered to be immoral or bad.

Approximately half of the sample population felt that religion is an important aspect of life. Females express a higher degree of dependency and need for religion than males. Marked variation in church attendance and participation were noted among the racial groups, nonwhites higher than whites. The unemployed sample and the unmarried groups expressed a stronger need for religious affiliation and the security they derived from it than other groups.

Learned Ways of Dealing with Tension

Information dealing with this area was secured by asking questions concerning the subjects' preferred kinds of recreation, life ambitions, perceived obstacles in securing ambitions, types of situations which typically arouse anger, kinds of people who make them angry, primary sources of worry, fears, and anxiety.

The results seemed to indicate a consistent inverse relationship between ambitions in life and functioning efficiency, as measured by job hierarchy and employment criteria. Levels of aspirations seemed to be higher for the low employment groups, and as a result more frustrations, worries, and fears emerge; these result in decreasingly effective tension reduction mechanisms. High vision group members experienced more frustrations and conflict, and perceived their blindness as a major source of tension. The shop and unemployed groups experienced more tension and anxiety in interpersonal interaction, and these two groups seemed to be the least capable of handling such conflicts. The unemployed, single, and low job hierarchy groups attributed many of their problems to blindness; those born blind worried least about their handicap.

Travel and Locomotion

Certain questions in the interview were designed to elicit information about the individual's ability to travel independently, and his attitudes toward traveling in general. Obviously, attitudes toward travel and one's ability to travel would be markedly affected by his remaining vision, if any. Accordingly, the first question asked, "Do you have travel vision?" Of the total group, 39 percent stated that they had some travel vision.

An additional 12 percent said that they had some travel vision, but their vision depended upon the time of day and upon weather conditions. Thirty-nine percent stated that they had no travel vision at all. Data was not available on 8 percent of the sample.

In general, the results seem to indicate no sex differences, and the amount of remaining vision did not seem to be related to job achievement. The competitive group reported having the lowest degree of travel vision, the agency and vending group having the highest. Approximately half of the total sample felt confident and at ease when traveling. Where there was some relationship between travel vision and travel ease, the low vision group seemed to be able to travel as adequately as the high vision group. Here again, the self-concept, and adjustment to and acceptance of blindness, seem to be related to ease and independence of travel.

Family Adjustment

Several questions asked about family interaction and family adjustment.

A high positive relationship existed between vocational success and family adjustment. The agency and vending group, and the high job hierarchy group, expressed greater satisfaction in family adjustment than did the unemployed and the low job group. It was interesting to note that the divorced group felt their families rejected them and overprotected them to a greater extent than the married group. The high vision group expressed a lower degree of family adjustment. They dated less frequently and participated in social activities to a much lesser degree than the low vision group. This marginal adjustment has been indicated several times previously.

Employment History and Employment Potential

A number of questions in the interview were specifically designed to elicit general information concerning the individual's attitude toward work, his work experience, and his employment potential.

The content analysis of these questions indicates that a large proportion of this blind population (60 percent) was satisfied with employment and working conditions, but a unanimous complaint was that the work was tiring, dirty, confining, and at times monotonous. Women seemed to be more satisfied with their present jobs than men. The shop and low job hierarchy groups expressed the highest degree of dissatisfaction with present employment conditions and indicated that they would change jobs if given a chance. Those individuals who were blinded late in life seem to find securing a job more difficult. It was also interesting to note that more males were instrumental in securing their own jobs than females. Also that

while 6 percent of the men were self-employed, no females were their own employers. A somewhat unusual finding was that while only 7 percent of the males were unemployed, approximately the same proportion (8 percent) of the females were also unemployed.

Interpersonal Interaction

Several questions in the interview secured information relevant to patterns of interpersonal interaction.

An overwhelming majority of the blind population stated a preference for working in outside industry and with sighted workers. Approximately half of the shop, low job hierarchy, and high vision groups demonstrated a considerable social inadequacy. This was manifested by low participation rate in social clubs, community activities, and interpersonal interaction. The competitive, high job hierarchy, and agency groups seem to derive a great deal more satisfaction from social interaction.

Some rather large sex differences were apparent in the responses. More females denied that blindness hindered their happiness and enjoyment of life than males. A larger percent of the men than the women indicated that their lives were hindered by the visual handicap.

A second scoring technique was designed to assess the predictive validity of the diagnostic interview (Husni-Palacios, Newberry, and Bootzin, 1966). This approach to interview analysis lies between content analysis, clinical global interpretation, or the dictionary type of word count (Decker, 1964; Stone, 1962). This method attempted to rank-order the interviewed persons objectively and quantitatively on the various adjustment continua defined previously.

Only 43 of the interview items were utilized for this profile analysis (some items eliciting highly stereotyped answers were dropped). A random sample of 144 protocols was submitted to profile analysis; of these, 32 respondents worked in competitive settings, 51 in shops, 22 in agencies, and 7 in vending stands. Thirty-two were unemployed.

DEVELOPMENT OF THE SCORING TECHNIQUE

Specific criteria were set up for each question, response categories were weighted so that the more maladjusted a response, the greater the weight. Weighting was determined by the clinical judgments of three clinical psychologists who worked very closely in the interview. The score for any one continuum was simply the sum of the weights assigned to each response subsumed under the continuum (Husni-Palacios, 1964). Interrater reliability was obtained by the independent scoring of 10 protocols by two judges.

The average interrater reliabilities obtained from analysis of variance formulae were (1) perception of blindness, $r = .88$; (2) religiosity, $r = .91$; (3) learned ways of dealing

with tension, r = .75; (4) ability to travel, r = .77; (5) family adjustment, r = .91; (6) work history, r = .79; and (7) interpersonal interaction, r = .89. These coefficients, unusually high for rating scales, were particularly encouraging because of the small sample and the necessarily restricted range.

Validity

Job Hierarchy. It was hypothesized that scores on the Diagnostic Interview would be inversely related to occupational achievement. The more maladjusted the *S* in each area of the interview, the less likely it would be for him to be in a complex or responsible position. The Job Hierarchy Scale (Jones, 1960) was used as the criterion for job success. Unemployed subjects were not included in this analysis.

Employment Location. In addition to vocational achievement, certain hypotheses were made regarding the location of employment. The employment environment and its unique demands would be expected to reflect differences in adjustment. Accordingly, the sample was divided into five employment groups based upon location: (1) Competitive Employment; (2) Shop Employment; (3) Agency Employment; (4) Vending Stand Employment; (5) Unemployment.

It was expected that unemployed subjects would be the least well adjusted. Shop employees, working in a sheltered atmosphere, were expected to be more adjusted than the unemployed subjects, but less adjusted than the other employment groups. No major differences were hypothesized between the remaining three groups, since each required personal initiative and contact with sighted people.

Results

Job Hierarchy

The intercorrelation matrix for the adjustment continua and Job Hierarchy Scale is presented in Table 2. A multiple r of .484 was obtained. Realistic acceptance of blindness, good work history and potential, and adjusted interpersonal relations were significantly related to occupational achievement.

Employment Location

Table 3 gives results from an analysis of variance using the competitive, shop, agency, vending, and unemployed groups. Of the seven continua perception of blindness, ways of dealing with tension, and interpersonal relations were significant beyond the .01 level; work history and potential was significant beyond the .05 level; religious conflict, ability to travel, and family adjustment were not significant.

Table 2

Intercorrelation Matrix of the Interview Profile Analysis and Job Hierarchy

	I	II	III	IV	V	VI	VII	J.H.
I. Perception of blindness	-	.136	.457	.204	.328	.353	.432	.381
II. Religious conflicts		-	.030	.010	.012	-.033	.173	-.203
III. Learned ways of dealing with tension			-	.258	.237	.397	.579	-.227
IV. Travel				-	-.009	.247	.412	-.176
V. Family adjustment					-	.216	.211	-.002
VI. Work potential						-	.300	-.308
VII. Interpersonal interaction							-	-.254

R_0 (I, II, III, IV, V, VI, VII) = .484

N = 112

It was expected that all seven of the adjustment continua would differentiate among groups. The obtained results indicated either that religious conflict, ability to travel, and family adjustment were not related to employment location, or that the interview was not validly measuring these three areas. It seems more likely that the instrument was inadequate since these three scales had the least number of questions which defined them, and therefore the smallest range of scores.

Table 3 shows that the four continua which were significantly related to vocational achievement were intercorrelated, and that correlation coefficients ranged from .300 to .579. The positive intercorrelations are in further support of the hypothesis that adjustment in all validly measured areas of the interview would be related to job environment.

Table 3

ANOV of the Interview Profile Analysis and the Employment Groups

		Source	df	MS	F
I.	Perception of blindness	Groups	4	167.192	11.125[a]
		Error	139	15.028	
II.	Religious	Groups	4	6.426	1.131
III.	Learned ways of dealing with tension	Groups	4	128.318	6.658[a]
		Error	139	19.272	
IV.	Travel	Groups	4	2.084	1.084
		Error	139	1.921	
V.	Family adjustment	Groups	4	2.214	0.649
		Error	139	3.408	
VI.	Work potential	Groups	4	39.900	3.305[b]
		Error	139	12.069	
VII.	Interpersonal interaction	Groups	4	288.534	28.502[a]
		Error	139	10.123	

[a]Significant at the .01 level.

[b]Significant at the .05 level.

Table 4 presents the means and standard deviations of the four significant continua. *F*-tests, applied to all possible paired comparisons of agency, vending stand, and competitive groups demonstrated no significant differences ($p > .10$). However, the mean of these three groups differed significantly from both shop employees ($F = 15.55$, $p < .01$) and unemployed *Ss* ($F = 32.89$, $p < .01$) in perception of blindness. Unemployed *Ss* were significantly more maladjusted than shop employees ($F = 6.09$, $p < .025$). The results are interpreted to indicate that the unemployed group perceived their blindness as a crippling handicap, and that their self-concept was markedly dominated by feelings of inferiority. The shop group was more adjusted, but exhibited a passive attitude toward the environment. They expected and demanded special privileges because of

Table 4

Means and Standard Deviations of the Interview Profiles and the Employment Groups

	N = 22 Agency	*N* = 32 Competitive	*N* = 7 Vending	*N* = 51 Shop	*N* = 32 Unemployed
I. Perception of blindness					
Mean	13.36	15.31	14.86	17.61	19.75
SD	1.75	2.97	2.75	4.93	4.22
II. Religious conflicts					
Mean	5.45	6.56	7.00	6.51	6.66
SD	1.21	2.47	5.25	2.43	2.20
III. Learned ways of dealing with tension					
Mean	18.55	19.19	18.14	21.06	23.69
SD	4.86	4.30	4.77	4.89	3.46
IV. Travel					
Mean	5.00	5.44	4.71	5.41	5.63
SD	1.18	1.24	0.82	1.46	1.69
V. Family adjustment					
Mean	3.23	3.03	3.43	3.51	3.72
SD	1.89	1.56	0.85	2.06	1.97
VI. Work potential					
Mean	9.32	10.00	9.28	10.55	16.81
SD	1.46	1.67	1.94	2.73	2.34
VII. Interpersonal interaction					
Mean	9.64	11.37	10.14	11.94	12.81
SD	3.44	3.72	2.89	3.38	2.24

blindness. The agency, vending stand, and competitive *Ss* perceived their blindness in a more realistic manner, were not overwhelmed by guilt or feelings of inadequacy, and felt that they could live a full and enjoyable life.

Similar results were obtained with the "learned ways of dealing with tension" continuum. The mean of agency, vending stand, and competitive *Ss* differed significantly from shop employees ($F = 7.47$, $p < .01$) and unemployed subjects ($F = 23.95$, $p < .01$). The unemployed group was significantly inferior to the shop group in the use of tension-reduction mechanisms leading to adjustment ($F = 7.18$, $p < .01$). In other words, agency, vending stand, and competitive *Ss* seemed to be able to resolve conflicts more efficiently, enjoyed life more fully, had realistic and attainable ambitions, and expressed a positive self-concept. The unemployed, and to a lesser extent the shop, group expressed unattainable goals, exhibited feelings of guilt concerning recreation and play, and were encumbered with fears, anxieties, worries, and conflicts in dealing with everyday situations.

Most of the variance in work history and potential was due to the very high score of the unemployed *Ss*. They differed significantly from other groups beyond the .01 level; the remaining groups did not differ from one another, although the differences were in the expected direction. Unemployed *Ss* indicated their difficulty in securing and holding a job, negative attitudes toward work, dependency needs, and feelings of inadequacy in achieving economic security and independence. In contrast, the other *Ss* expressed confidence in ability for gainful employment, derived a great deal of satisfaction from their jobs, and felt that blind people should be self-supporting and self-sufficient.

The mean of agency, vending stand, and competitive *Ss* for interpersonal interactions differed significantly from shop employees ($F = 5.82$, $p < .025$) and from unemployed *Ss* ($F = 10.47$, $p < .01$). The shop group did not differ significantly from the unemployed group ($F = 1.50$). The agency, vending stand, and competitive *Ss* seemed to exhibit confidence and pleasure in interpersonal relations. They belonged to and actively participated in social organizations and did not experience feelings of social isolation and rejection as a result of blindness. The unemployed and shop *Ss* felt inadequate in social interaction, were social isolates as a result of their visual handicaps, and experienced frustration and anger when dealing directly with people.

Discussion

All four of the significant continua--that is, perception of blindness, learned ways of dealing with tension, employment potential and work history, and interpersonal interaction--differentiated among groups, both as a function of position in the job hierarchy and of location of employment. In the perception of blindness continuum, the unemployed *Ss* were significantly more maladjusted than the *Ss* who worked in blind workshops, and

the shop employees were significantly more maladjusted than the members of the other three groups (competitive, agency workers, and vending stand personnel). Exactly the same results were determined as a function of the category, "learned ways of dealing with tension." In the employment history and work potential continuum, only the unemployed group was significantly differentiated from the other four groups. However, the remainder of the results were in the hypothesized direction (that is, that the shop employees would be more maladjusted in employment than the other three groups), and it is possible that a more rigorous definition of this continuum would result in the appearance of statistically significant differences. There were no differences between the shop workers and the unemployed *Ss* as a function of the "interpersonal interaction" category. Both of these groups, however, were significantly different from the agency, vending stand, and competitive groups. This indicated that the unemployed and the shop groups have equal degrees of difficulty in interpersonal relations, and that the remaining three groups are approximately equally facile in interacting with other people.

Although three of the continua (family adjustment, travel, and religiosity) did not differentiate among the groups, all of the statistical results were in the predicted direction. The authors feel that the inclusion of a larger number of items in these categories and a more rigorous definition of the continua would alter them sufficiently to bring about results at an acceptable level of significance (Husni-Palacios, Newberry, and Bootzin, 1966).

REFERENCES

Bingham, W. V. D., Moore, B. V., and Gustad, J. W. *How to Interview.* 4th ed. New York: Harper, 1959.

Burroughs, G. E. R. "A Study of the Interview in the Selection of Students for Teacher Training," *British Journal of Educational Psychology,* 28:37-46 (1958).

Campbell, J. T., Prien, E. P., and Brailey, L. G. "Predicting Performance Evaluations," *Personnel Psychology,* 13:435-40 (1960).

Dudek, E. E. "Personnel Selection," *Psychological Review,* 14:261-84 (1963).

Husni-Palacios, M. *The Diagnostic Interview: Scoring and Interpretation Manual.* V.A. Hospital, Marion, Indiana, 1964.

Husni-Palacios, M., Newberry, L. A., and Bootzin, R. R. "Predictive Validity of the Interview," *Journal of Applied Psychology*, 50(1):67-72 (1966).

Jones, W. R. *The Development of Nonverbal Intelligence Scale for the Adult Blind.* Unpublished doctoral dissertation, Purdue University, 1960.

Stone, R. J., Bales, R. F., Wamenwirth, J. Z., and Ogilvie, D. K. "The General Inquirer: A Computer System for Content Analysis and Retrieval Based on the Sentence As a Unit of Information," *Behavioral Science*, 7:1-15 (1962).

Discussant: Martin Dishart

If a test is all valid or all invalid it presents no significant problem. We just use it or don't use it. But when a test has both strengths and weaknesses, or both validities and invalidities, the problem is to know which is which. If we know that, we can use it wisely. If we don't know which uses are invalid--even though they may be only a small part--then none of the test can be used wisely.

Whether we like it or not, the most important thing in evaluation is the purpose. The purpose will decide who and what will be evaluated and with which tools. The purpose will exclude what is not necessary. But we must consider the true or primary purpose because there can be many secondary purposes for evaluation which do not really count.

If the primary purpose of a supermarket owner is to make a profit and his secondary purpose is to improve my nutrition, he will probably want to evaluate my buying behavior in terms of what is profitable rather than what is nutritious.

Today, I would like to consider the implications of these tests from the points of view of four possible kinds of users--although there are many others.

First: the blind adult who wants to know more about himself in order to make things better for himself. He wants to know how he compares with other people, both blind and sighted; what he can and cannot do; his strengths and his weaknesses. Blindness may or may not be his major weakness; but he probably thinks it is. A vocational objective is probably very important to him; but other things may be more problematic. To the blind person, evaluation often means "magic answers." It should, but doesn't often, mean

more information and clues which should be explored and considered for planning and decision-making.

Second: the vocational rehabilitation counselor, or other professional, whose main job is to help the blind person achieve a vocational objective. His client's needs are all important; but most important are those needs which pertain to or lead to getting the client employed. The counselor himself may be evaluated, partly, on the number of blind people he places on jobs each fiscal year. To the counselor, evaluation means evaluating for ultimate job placement. He wants to know how and why test scores were obtained so that he can know what services his client needs.

Third: the employer. He would like to "help out" a blind person but--unless he is using the blind person for public relations--the employer generally wants a reliable person who will do the job well without any fuss or trouble. To the employer, evaluation means finding such a worker for each job. The employer will use test results to screen out unsuitable applicants. He cares about the score, not why or how it was obtained.

Fourth: the rehabilitation program planner, researcher, or administrator. He is interested in all adults with less than 20/200 or 20 degrees of vision who are unemployed. He wants to know what stands between these people and employment and would like to provide, or at least plan for, the missing ingredients. Federal, state, and private agency funds stand behind him. Evaluation means summated data, broken down, cross-validated, correlated, and studied for community needs, services, and costs. Individual needs are summated.

Let us keep in mind what these tests offer to the above-described four types of users: (1) The blind person; (2) His vocational rehabilitation counselor; (3) The employer; (4) The rehabilitation program planner.

I. The Biographical Data Blank

1. The blind person already knows his biographical data but might like to use some of the predictive items to alibi for his failures or to show other people why he is special as a blind person.

2. His counselor absolutely needs such data to consider possible rehabilitation plans with the client, for his records, and to remember his clients, but would probably not rely upon its predictive validity for selective placement.

3. The employer might use the predictive items to screen people out but not in.

4. The program planner would be very interested in the summated biographical data, and any correlations with types of employment, for planning facilities, needed services, and program costs.

II. Vocational Intelligence Scale for the Adult Blind (VISAB)

This test has an internal consistency reliability of +.91 and correlates +.63 with the WAIS Verbal--which sounds impressive, but may be misleading.

The +.91 simply means that the test is not invalid because of lacking internal reliability. Regarding the correlation (coefficient) of .63 with the WAIS Verbal, if the correlation were 100 percent we could eliminate one test because they both would measure the same things. The real question is what DOES the VISAB measure? The WAIS Verbal has six subtests which can show not only the score obtained by a person but information about how and why he obtained it. Ten people might have the same score but for different reasons; one might be working at his peak, one might be handicapped by fear or anxiety, another may not hear well or understand how to score high, and so on. What can the VISAB tell a blind person about himself or a counselor about his vocational potential and unmet needs?

This brings us to another point. When we test someone and use norms, we are comparing the individual with the group of people upon whom the test was standardized. The WAIS was very well standardized on sighted people. If the WAIS Verbal is administered correctly to a blind person, his blindness is not a significant handicap to his performance. He can thus be compared with the sighted population with whom he must compete for competitive employment. The VISAB, as it was presented, compared the blind person with other blind people. In such comparisons, the employer may be offered the best blind worker but not necessarily the best worker for the job.

The program planner may know that certain employed blind people have a high VISAB score; but he doesn't know what would be the VISAB scores of sighted competitors in community jobs. If, on the other hand, the VISAB really measures learned skills of blind people, it is an achievement test and not a non-verbal intelligence scale. However, the VISAB does seem truly valuable as a measure of one kind of abstract non-verbal intelligence. But it should not be used with a "lumped together" WAIS Verbal score and serves little purpose as an employment predictor.

III. The Sentence Completion Test

This test has 43 unfinished sentences designed to present conflicts and problems in six areas: (1) peer relationships; (2) environmental interaction; (3) authority figures; (4) family relationships; (5) heterosexual interaction; and (6) relationships with friends.

The real, true-life, problems are the ones that hurt. Sometimes they hurt so much that a person can't talk about them. If

problems are made still more difficult to acknowledge by blindness, then sometimes they can be teased out--or rather teased into awareness and recognition--but only by a very skilled therapist using this as a means toward the end of a full recognition of truths.

If sentences are completed for the purpose of scoring and correlating, I think it is likely to reward unhealthy behavior in the client. He is "good" for talking about "problems once-removed." He gains practice in not really facing the true, direct, issues and problems of reality. He may even find it rewarding to call his secondary problems his primary ones.

IV. The Tactual Reconstruction Pegboard

This test seems to have much to offer in the evaluation of tactual perception, kinesthetic judgment, workspace and workspot orientation, tip of finger dexterity, workspeed, etc. It should be used to evaluate what it measures in terms of relative strengths and weaknesses. It should not be used as a competitor for tests of verbal skills in predicting job success.

V. The Sound Test

This, like all projective techniques, really consists of the subject responding to certain unfamiliar stimuli for the first time while the examiner, who has given the test many times, notes details of the responses. The assumption is that "the blind subject's responses to auditory stimuli may lend some insight into his private world of feelings and meanings."

A major implication of this and similar tests is that the main responsibility should be upon the examiner and not the tool. If the tool is used mechanically, it will not provide much for the client or his counselor. If the findings can be shared with the client so as to facilitate insight, it could be very helpful. The important thing is not what was said or how the shuffled score correlates with something, but why it was said and what it means to the client and what the client can learn about himself from it.

VI. The Wechsler Adult Intelligence Scale Verbal (WAIS-Verbal)

This is a very sensitive instrument, very well developed, and capable of providing a tremendous amount of information if administered by a skilled clinician. It enables an evaluation of the blind person, in six areas of intelligence, whereby he can be compared with the sighted population--or with himself without a

handicap of blindness. It is the only such test in this battery. Its qualitative and quantitative offerings completely outclass any of the other tests in this battery. For that reason it should not be thought of as a score to bolster the validity of the VISAB or to correlate with a job scale. Rather these other tests might be better considered as important supplements to a good WAIS Verbal evaluation.

VII. The Diagnostic Interview

The last section on the test battery we are considering utilizes 68 open-ended questions designed to elicit various kinds of information in areas such as perception of blindness, religion, tension reduction, mobility, family adjustment, and work history. A counselor might find such items helpful although it might be more fruitful if the client talked about what was important to him.

Most of what are presented as findings, from this battery, about blind people have been known for a long time. This would include such "findings" as the special difficulties of the partially sighted as compared with the totally blind, the different attitudes and outlooks of people competitively employed, sheltered employees, and the unemployed, and relationships between various subcultural roles.

In summation then, all of these tests offer information to certain users. In order to maximally help the blind person and/or his counselor, the blind person should be in on the interpretations which should be individual rather than by assignment into a statistical category. The predictions of job category seem of questionable value. There does not seem to be a significant amount of new information from the data. Good evaluation seems more dependent upon the examiner than on anything else.

Perceived Pleasantness: A Stimulus Variable In Auditory Projective Testing

Ilana Breger

In psychodiagnostic testing with blind clients the author observed the negative tone of the projective response to the auditory projective technique (the APT). Unpleasant thematic material and negative affects were often elicited. It seemed possible that auditory projective stimuli were perceived as unpleasant and were evocative of unpleasant associations (rather than of those associations which might be produced in response to less or differently affectively-charged stimuli). This study was conceived to explore the perceived pleasantness of auditory projective stimuli and to determine if the pleasantness of these stimuli were related to the emotional tone and other aspects of the projective response.

Several investigators have independently observed the negative tone of the projective response to the APT (Abramson, 1963; Bean, 1965). Kramer and Aronovitch (1967), noting the neutral or negative outcomes as well as negative tone of stories told in response to Braverman-Chevigny sound effect sequences, interpreted their findings as resulting from specific stimulus pull or from a property of the auditory mode. Bean has observed "a fairly consistent tendency for auditory stimuli to arouse more unpleasant themes as compared with pleasant ones than the (TAT) pictures produced" (1965, p. 158). Bean's test includes, for example, the sounds of: a scream of terror, an explosion, and groaning in pain. The question may be raised whether sounds such as these exert "affective pull" just as TAT stimuli exert "picture pull"; and whether this imputed stimulus pull is related to thematic material with the APT, as it is with the TAT (Eron, 1950; Eron, Terry and Callahan, 1950; Newbigging, 1955).

Pilot work was carried out to determine if sounds differed in perceived pleasantness. Three independent samples used a five-point scale to rate the pleasantness of selected sounds from the Braverman-Chevigny and Wilmer-Husni tests. Test-retest reliability based on 16 *S*s rating 12 sounds was acceptable ($r = .84$; $p < .005$). Pilot work findings suggested that:

1. sounds could be discriminated on the basis of perceived pleasantness ($N = 60$; $F = 21.42$; $p < .01$);
2. three independent samples seemed to rate sounds similarly ($N = 125$);
3. there appeared to be consistent individual differences in rating patterns of sounds ($N = 60$; $F = 2.08$; $p < .05$);

4. many auditory stimuli or two tests seemed to be perceived as unpleasant ($N = 5$; chi square = 38.05; $p < .01$);

5. a five-point scale seemed to provide sufficient discrimination for use with auditory projective stimuli.

It was hypothesized that perceived pleasantness of sounds was related to three aspects of the projective response: happiness, RT, and length of stories; and that story happiness of blind and sighted *S*s would differ.

The sample included 30 blind and 30 sighted *S*s. The blind sample consisted of legally blind males recruited through the cooperation of the Industrial Home for the Blind in New York. One third of this sample were totally congenitally blind; two thirds had partial vision, but had been classified as blind prior to age six. These *S*s were administered the verbal subtests of the WAIS and the Haptic Intelligence Scale for Adult Blind (Shurrager and Shurrager, 1964), and subjects who obtained below average or highly discrepant scores on these measures were excluded. Hearing deficiency or gross organicity were criteria for exclusion. The blind *S*s were comparable in age (16 to 30) and intelligence (above average) with 30 sighted male college students who served as the sighted *S*s.

The experimental procedure consisted of obtaining stories in response to and judgments of pleasantness of eight sounds. These sounds had been selected from a pool of 35 auditory projective stimuli on the basis of consistency of rating at varying degrees of pleasantness. The pleasantness of the sounds was rated on a five-point scale. The stories were evaluated for emotional tone by four judges with training in projective methods. The stories were rated along a seven-point continuum from Most Happy (+3) to Most Unhappy (-3). Inter-rater reliabilities for judgments of story happiness were acceptable (r ranged from .64 to .87, $p < .01$).

For each of the eight sounds separately, correlations were computed to determine if perceived pleasantness was related to story happiness, RT, and story length. Story happiness was found to vary positively with perceived pleasantness for five out of eight sounds (for example, male dialogue (B-C), train (W-H), fight (B-C), footsteps (W-H), and weeping (W-H). Pleasantness was not found to be significantly related to story length nor to RT except for the sound of weeping. Story happiness of blind and sighted persons did not differ. Analyses of variance for the factors of blindness-sightedness and order were carried out separately for each of the eight sounds and the results indicated significant differences between blind and sighted *S*s on story length, with blind persons telling longer stories. An order effect was found.

Discussion

That auditory as well as visual projective methods may elicit negatively-toned responses by virtue of specific stimulus properties seems an important finding adding support to the generality of theory and research in projective methods. Studies which have noted the negative tone of the projective response to the APT may require reevaluation in terms of stimulus pull (Abramson, 1963; Bean, 1965; Kramer and Aronovitch, 1967). The implication of this finding for the clinician using the APT is that the use of this method requires evaluation of stimulus properties to avoid making inaccurate inferences about personality.

Based on a qualitative appraisal of the data, observations were made of apparent consistent individual differences among both blind and sighted *Ss* on both content and structural variables of the projective response. This suggests that the APT may be useful in the study of perception, cognition, and personality in both blind and sighted *Ss*. The APT would seem to be of value for both clinical assessment and research purposes.

Recommendations for Future Research

1. Systematic research to determine the potential usefulness of the APT in psychodiagnostic assessment of personality of blind and sighted persons.
2. Research on the relationship between auditory perception and projection with a focus on the relation between particular types of perceptual deviation and particular aspects of the projective response.
3. Use of the APT in the research of perception and cognition of blind persons.
4. Use of a "judged group norms" approach in obtaining normative data with the APT. Exploration of specific parameters of an experimental APT based on judged group norms.
5. Cross-cultural research in auditory perception.

Summary

In psychodiagnostic testing with blind clients, the negative tone of the projective response to the APT was observed. It had seemed possible that this negative tone might be related to perception of stimulus properties of the APT. Pilot work suggested that auditory projective stimuli were discriminable on the basis of perceived pleasantness, and that many auditory stimuli were perceived negatively. The results of this study suggested that story happiness varies positively with perceived pleasantness of auditory stimuli in five out of eight cases. The specific implications of these findings are that the clinical examiner must consider affective pull of the stimulus when

evaluating clinical material obtained from the use of the Braverman-Chevigny or the Wilmer-Husni APT.

REFERENCES

Abramson, L. S. "A Comparison of an Auditory and a Visual Projective Technique," *Journal of Projective Techniques*, 27:3-11 (1963).

Bean, K. L. "Scoring and Interpreting Responses to Semistructured Sound Effects," *Journal of Projective Techniques*, 29:151-60 (1965).

Braverman, Sydell, and Chevigny, H. *The Braverman-Chevigny Auditory Projective Test: A Provisional Manual.* New York: American Foundation for the Blind, 1964.

Eron, L. D. "A Normative Study of the Thematic Apperception Test," *Psychological Monographs*, 64 (whole No. 315, 1950).

Eron, L. D., Terry, Dorothy, and Callahan, R. "The Use of Rating Scales for Emotional Tone of TAT Stories," *Journal of Consulting Psychology*, 14:473-78 (1950).

Kramer, E., and Aronovitch, C. D. "A Normative Study of an Auditory Projective Technique," *Journal of Projective Techniques*, 31(4):88-91 (1967).

Newbigging, P. L. "Influence of a Stimulus Variable on Stories Told to Certain TAT Pictures," *Canadian Journal of Psychology*, 9:195-206 (1955).

Shurrager, Harriet C., and Shurrager, P. S. *Haptic Intelligence Scale for Adult Blind.* Chicago: Illinois Institute of Technology, 1[illegible].

Wilmer, H. A., and Husni, May. "The Use of Sounds in a Projective Test," *Journal of Consulting Psychology*, 17:377-83 (1953).

Psychological Factors in the Evaluation of Sensory Aids

Benjamin W. White

It was a meeting with John Dupress that first involved me with problems of sensory aids for the blind. He bluntly remarked that after 100 years, braille, the cane, and the guide dog were not enough. He said this to me while I was working in a huge, lavishly financed laboratory--a world center of research on communications devices, computers, and radar technology. All those who heard John speak that day knew that this technology could immediately be put to use in the design of sensory aids, and that the main problem was to pry loose the men and money to do the job. John, of course, had known this for some time, and was restlessly flying from one end of the country to the other to get his message to laboratories, government agencies, and universities, and then to needle them, once the message was delivered, to do something about it. He was quite a needler, as a number of you can testify. I am sure that I am not the only person who was prompted to do something in the area of sensory aids because I had been stung by this gadfly. And I am also sure that the day when the blind would have something more at their disposal than braille, the cane, and the guide dog has been significantly hastened through his efforts. He was to have been the discussant for this session, and he is greatly missed.

As a psychologist charged with talking about psychological factors in evaluation of sensory aids, I must begin by stating bluntly that members of my profession should be humble in passing out advice in this area. Because of certain historically rooted preoccupations with end organ physiology, and burdened with a neuromythology which is only now beginning to give way under a crushing weight of contradictory evidence, we have busied ourselves almost exclusively with a tedious series of threshold determinations and psychophysical functions which are of dubious relevance to the design of mobility aids or reading machines. Despite mountains of data on the legibility of various type fonts, we know relatively little about the process of sighted reading of the printed word. There is still disagreement, for example, as to whether one should learn to discriminate letters or words first. Despite the fact that braille has been around for years, we have relatively little knowledge about using the skin as a means for getting symbolic or pictorial information to an observer. And it is only recently that we have begun to appreciate what a marvelously intricate process is involved in the production and comprehension of speech.

So it may be a while yet before the psychologist will be able to give the engineer many useful specifications for the tactual or audible display of language which will enable one

to read at speeds approximating those of sighted readers using the printed page; or to say just how information about the immediate physical environment can be displayed in nonvisual ways so that one will be able to interact with and move about in that environment free of fear of injury. But there are signs that we are beginning to do relevant experiments in this area: Eleanore Gibson's work on the discrimination of letter-like forms, Paul Kohler's intriguing experiments on reading, Neisser's elegant work on list searching; James Gibson's current work on sheer and occlusion at an edge as information used in detecting the arrangement of objects in our three-dimensional world, and the impressive work of the people at the Haskins Laboratory on speech perception and production. Such work is bound to generate useful guidelines for effective sensory aid displays. So if you find us disappointing as a source of human factors information in designing sensory aids, don't give up, because I think useful information is forthcoming. And in the meantime, many worthwhile devices are going to be developed anyway. We psychologists are useful to have around, but modesty compels me to say that we are not indispensable. After all, braille was developed without any help from us. I rather suspect that if we had been consulted we would have said it was impossible.

Aside from this particular area of application of psychological knowledge to the design of sensory aids, I think psychologists may be able to offer other kinds of help less oriented to devices than to the human beings who employ them. Though it is rapidly becoming the most well-worn cliche of the century, we really have to think of the whole man when considering reading machines and mobility aids.

First, the matter of reading. There are two enormous problems in the matter of designing reading machines for the blind. To one, we have devoted considerable attention; this is the problem of converting text into a form which can be read by the blind. There is a growing number of devices or systems which can now accomplish this: talking books, tape recordings, braille books, sighted readers, and several more under development at the present time. All these solutions work in some sense; all have their serious limitations; and there is every reason to believe that the existing technology is capable of providing devices which are an order of magnitude better than any which now exist. That is one part of the problem. The other part has not received as much systematic attention. That is the problem of how the blind person can be put in touch with current developments so that he will know what it is he wants to read. And given that he knows what he wants to read, how does he go about getting it? As things now stand, the overwhelming amount of material readily available to the blind is recreational reading: old favorites, classics, *The Reader's Digest*, and Perry Mason mysteries. Current best sellers, current periodicals like the *Scientific American*, *Harpers*, or *Look*, or

current technical scientific journals are next to impossible for the blind to get at quickly and easily except by way of a sighted reader. How can ways be provided which make it possible for a blind person to keep abreast of the publications in his field of interest, and for him to get access to documents which he wants?

Now this just happens to be a problem of crisis proportions which is by no means unique to the blind. Government agencies, universities, laboratories, professional groups, and librarians are beginning to insist audibly that existing means for allowing someone to keep abreast of his field and to get quick access to documents in that field are inadequate and getting worse at an alarming rate. There is a growing conviction that the solution to this problem is going to require radical changes in the institution of the library and the way in which text is stored and distributed to readers. Highly specialized storage and retrieval systems such as those used by the airlines and the stock market are built and working, but a true library system which will permit users with widely varying interests to scan, browse, and to get at the documents they want quickly and inexpensively is a very complex undertaking, and no one today could say how it should best be done. I think that one of the things which discourage people from going ahead and building an experimental system is that it is hard to think of one which will be complex enough so that it will be really useful to a set of users, but small enough so that it can be built in a finite period of time and with a finite amount of money. I would like to suggest that the blind population should be seriously considered as a test population for trying out experimental information retrieval and distribution systems. I can think of no other population which would be more wholeheartedly involved in such a venture, who need it more, or who could provide more useful data vital to evaluation and improvement of such a system. It is a population small enough so that the first experimental systems could be relatively modest, and yet diverse enough in interest so that the system would have to be truly broadband.

Two things attract me about this use of the blind as an experimental population for the testing and evaluation of automated libraries. First and foremost, it brings them in at the beginning, so that any system which is developed will not lock them out. I have heard a lot about systems which might employ some sort of TV or CRT display of text as an output to the reader and microfilm as a storage medium in the library. Such a system will be of comparatively little use to the blind unless complex and expensive terminal equipment is put at the terminal to convert the video image into a tactual or auditory image. Second, it will give the blind an active and productive role in the creation of the system. Instead of being passive recipients, they will be active participants. Such a role will

put the blind in active communication with many other segments of the community. Instead of being in the usual role of a handicapped group with special needs, they are now a group with needs which parallel to those of the rest of the community and in a unique position to assist in devising new ways to meet those needs for the benefit of all. To the extent that information retrieval and dissemination systems are worked out which can be of service to both the sighted and the blind, the latter will be spared the additional expense of having to provide special purpose devices which enable them to use it.

Even with computers participating in the rapid production of braille from teletypsetter tape as in DOTSYS I fear that the system is going to be expensive just because the market is small, the equipment complex and useful only to the blind, so that they will have to bear its full cost, or persuade others to do so. With an automated library system provided with audio outputs, there will be virtually no incremental cost to making the service available to the blind.

In any event, I suggest that in evaluating systems for bringing text to the blind, we look not only at the terminal device which creates the auditory or tactual display, but at the larger problem of how to enable the blind to find out what text to ask for, and how to create a distribution system which will get it to them at reasonable cost. The existing means fail most miserably on this score, and it will be a hollow victory if we build a reading machine and ignore the problem of how to get the documents to play on that machine. This latter problem is not different in kind from that of the rest of the population and I hope that ways can be worked out which will be of utility to the entire population and which will require a minimum of special terminal equipment. To be more specific, I would like to see experimental systems installed in metropolitan centers which exploited the telephone as a terminal. The instrument is available at modest cost, and with pushbutton dialing the blind could make digital requests rapidly on an easily learned keyboard and receive auditory displays without special terminal equipment. The blind user could tape record the output locally if he wished the equivalent of hard copy. Such systems would depend heavily, of course, upon a perfection of the technology of speeded speech as an output and experimental work needs to be initiated immediately which will enable us to get some useful information on the optimal rates at which such a signal can be sent over commercial lines.

Turning now to the other major area of need for sensory aids, namely mobility, I would like to make a point essentially similar to the one I have been trying to make for reading. It seems to me that a large fraction of the work in this area has been devoted to the somewhat limited problem of obstacle detection. These devices essentially tell the user whether or not there is a reflective surface of a given size within some given

range. Some such devices display range information; others simply signal whether or not there is an object within a given range. The typical method of evaluating such a device has been to put subjects through obstacle courses and compare performance either in errors or in time to completion, of users of the device or none at all. I have no quarrel with this kind of criterion measure, but I do think it is rather limited and that we should begin thinking about more cognitively oriented evaluation as well. Having gone through the obstacle course with the device, what can a user tell us about the course? Can he describe its layout? At some point in the course does he know how to get to some other specified part of the course? If asked to describe the course, what features are mentioned? What features are ignored?

Now it is asking a lot of an obstacle detector to furnish this sort of complex information about the environment, and I suspect that detectors with a single yes-no output will be severely limited in this respect. But it is time we fully realized what these limitations are, and that they may be so great that many blind people will find simple obstacle detectors not to be worth the trouble and expense of carrying them. To give the blind information about the arrangement and disposition of objects in his immediate environment, it will almost certainly be necessary to have devices with multiple outputs, and if I had to place any bets at this point I would predict that these outputs probably will be tactual. At several laboratories there are now arrays of tactual stimulators arranged so that a wide variety of signals can be brought to them from computers or from TV cameras. This means that very soon we shall be in a position to know some of the possibilities and limitations of the skin as a means for getting information to the blind about his immediate physical environment. I think there is every reason to be optimistic about the possibilities of such multiple tactual devices. Again, there is the fact of braille. If people can read braille at rates in excess of 100 words a minute, then we should certainly have reason to believe that there is sufficient channel capacity in this modality to be able to tell the blind much more about his environment than whether or not there is an obstacle in it at a certain range and azimuth.

Some of you undoubtedly feel that I am urging third-generation sensory aids before the first generation models have even been built and tested. I would prefer to think that I have been urging a broad set of criteria to keep in mind when evaluating such devices: That in reading we not concentrate so hard on devices which can convert text into displays which are readable by the blind that we lose sight of the larger problem of devising ways to make it possible for the blind to find out what they want to read, and to get at it once they have found out. That in mobility we not concentrate so hard

on obstacle detection that we lose sight of the larger problem of conveying sufficient information to the blind about his environment that he not only avoids bumping into it, but can move through it with interest and enjoyment. . . . It is my belief that these larger objectives will cause us to discover that the needs of the blind in these respects are quite like those of many other members of the human community. In the mobility area, for example, there are many situations in which men need to move about in environments where they cannot use their eyes, and under these circumstances the needs of such people are going to parallel those of the blind. And in the reading area I have mentioned already the fact that the general problem of gaining access to desired documents is a critical one in many segments of our society. To the extent that such parallels between the needs of the blind and those of the rest of the society are recognized, to that extent we may hope that means can be worked out to satisfy the needs of both.

Such a recognition is bound to result in better sensory aids for the blind, and it will have the equally important effect of breaking down the barriers of isolation which have been erected in part because we have felt that the blind were a special disadvantaged group who could be helped only with special devices which were of no utility to the rest of the community. Another way of saying this is that if we build a reading machine which really works--which can deliver text to the reader at rates which compare favorably to those of visual reading of the printed page; which can give the reader access to a desired document quickly and inexpensively, and which allows the reader to record locally for permanent storage if he so desires--then we will have a something of immediate interest and benefit to the entire community, not just to the blind population. This means that we can look for a much wider level of support for the development of such a system than we could if we were considering a much more special purpose system which would be of use only by the blind. The same can be said of mobility aids. If they really work, then they will be of immediate interest to a much broader population than the blind. But if they are very limited, like the cane or the guide dog, then we are in the same old situation of having to finance development through special charitable funds or through government agencies which have limited and special resources for a particular disadvantaged group.

Let us remember that a sensory aid is a device for getting information to people. If it does so rapidly and efficiently, then it will be of use to all. The telephone, the typewriter, and the tape recorder were not developed for the blind, but they have all proved to be effective devices for getting information to people and are probably the most frequently used sensory aids the blind have. We should not forget this when we set about designing others.

Discussant: James C. Bliss

There are a number of questions that we can discuss in this paper and with regard to the sensory aids field in general. First, I would like to make some comments about a major problem of present concern in the sensory aids field, that is, how to go about evaluating any given sensory aid.

A very wide range of sensory aids have been proposed. In terms of complexity we can consider the range from the very simple sensory aid, which perhaps is nothing more than a lens, or a cane, or a single-point photocell which converts its signal to a single-point tactual stimulator, to some very complex sensory aids involving perhaps a computer terminal with an array of tactile stimulators that are operated in a very complex mode. But even for the relatively "simple" sensory aids, the man/machine system is extremely complex. The analysis of the man/machine system is even more difficult in the case of a complex system. It is orders of magnitude more complex than, for example, the stimulus-response kind of situation normally encountered in psychophysics.

The evaluation problem is really: What kind of man-machine analysis can be made to determine whether or not any given sensory aid can be of any use or not?, or, Are there aspects of it that have potential use or not? One approach to this man/machine analysis problem (and this approach will illustrate the crudity of the present state of the art), is to attempt to break the problem into pieces. Since this man/machine system is a feedback system, in which the man is receiving information from the sensory aid and then using that information to modify what he receives from the aid, an engineering approach is to open the feedback lock. There are several subquestions to consider in the process of analyzing the man/machine system. The first question is "Does adequate information appear at the output?" That is, in principle, could a computer be designed to receive the information that this sensory aid gives, and perform the necessary function? In certain cases this question can be answered on a more or less theoretical basis. For example, in terms of a reading aid for a totally blind person, I think we can specify pretty well what kind of information is needed at the output in order for English ink print to be machine recognized. But in the case of a mobility aid, on a theoretical basis, it is not clear what information is sufficient, and there is nothing much better in the way of an approach than trial-and-error.

Once it has been established that a sensory aid puts out adequate information, the second question is "Is the output information in a form that can be comprehended by humans, or by a human with the handicaps that the aid is supposed to help ameliorate?" The first question is an engineering question,

whereas the second question is more a psychological question. The second question can be further broken up into a number of other questions, such as "If it can be comprehended by a person, how much training is required?" "What kind of performance limits will be found even if it can be comprehended?" "What kind of individual differences will one find when different people try such a device?"

A third question which should be asked when looking at a sensory aid concerns interactions between the engineering aspects and the psychological aspects of the system. That is, if the machine were a little more complex, would it appreciably enhance the performance of the user with the machine? Even though the machine can give adequate information, and even though the person can comprehend this information, he might be able to do a much better job if the machine gave him a little more redundancy here and a little less redundancy there, a little more processing, and so forth.

This is one approach to breaking up the complex problem of sensory aid evaluation. Even after one does this, however, as Dr. White suggests, there remains the even bigger question of how to examine the overall system problem. For example, one can apply the previous three questions to braille, as follows: First, does it provide adequate information? It does. Second, can a person comprehend it? He can. Third, could it be improved? Not easily. From this one might ask: What is wrong with braille? The answer is, literally, nothing, but there is an overall system problem, namely, how to get reading material transcribed into braille in the first place. So the systems aspect of the problem must also be examined.

The systems problem of braille is the basis of the argument for direct translation reading aids. The objective of these aids is to try to make the materials that are used by the sighted directly available to the blind. If this can be done, even if at some sacrifice in performance, the overall system might be more efficient simply because we are using an existing system for distribution and availability, namely that system which has been developed for the sighted.

Regarding Dr. White's suggestion of a library at your telephone, I think this is a very interesting possibility, particularly the suggestion to use blind people to help develop such a system. An interesting point is that, as computer systems have developed, visual displays have been the output medium, rather than auditory displays. The reason for this is that conversion from computer signals to a visual display has been easier and required less memory storage than the conversion of computer data to an auditory display. However, when one considers time-shared systems and the existing communications system (that is, the telephone), it is clear that for communicating information over that system it would be more efficient were auditory displays developed. This suggests that once

the communications system becomes a large part of the overall system, an auditory display will win out over a visual display.

In accordance with Dr. White's suggestion to use a group of blind people for developing a library system using telephone lines, it might be appropriate to start with a subset of the blind population, and an interesting subset might be blind computer programmers. This could be a first step which would limit the range of documents to be put into the system, because the system users would have similar interests. Also, this group could communicate more easily with the system and its designers in the initial stages. Another suggestion is that one should look ahead beyond the idea of a central library to which one can get access through telephone lines. I believe this concept is going to be limited inherently by the enormous storage that would be required in the central facility. One should also consider the possibility of having the document at the terminal, and that it be translated by the facility into an auditory form. This concept is becoming feasible now, and this kind of service would be a logical extension of the first idea, while easing the storage requirements of the central library.

Dr. White's paper defends an excellent point of view, that we should be aware of and try to make the best use of equipment and technology that is developed for sighted people, adapting what we can to the blind population. This approach has the tremendous advantage that there are powerful economic forces pushing toward the development of systems for the sighted, and if these can be made available to blind people we can take advantage of that fact. The disadvantage is that we are likely to be unable to control these forces to any extent. If the emphasis on visual displays increases it is going to make the problem of the sensory aids designers even more difficult.

One problem with the telephone library is how, using purely auditory displays, can such things as graphs and pictures be communicated? This could be a difficult problem, and the only solution may be something added to the auditory output. There might have to be a tactile output, for example. The development of such a telephone system could be of great importance in finding out about the real needs of blind people, such as what their habits and capabilities are. The research aspect of such a system could reveal something interesting about the blind population.

As far as the mobility area is concerned, I predict that the type of optical-to-tactile image conversion system described by Dr. White will be important. For a long period of time people have suggested a visual prosthesis in which an optical transducer was used to stimulate the brain directly. However, an interesting observation is that the information-

bearing dimensions for cortical stimulation are frequency and spatial location. The discriminability of the brain to this type of electrical stimulation is similar to that of the skin to mechanical stimulation. I suspect that most people would rather have 100, or 1000, stimulators on their skin than on their brain. I feel that tactile stimulation is a much more practical approach, and perhaps has a greater chance of success.

The major problem in developing visual prostheses of this type lies in how to reduce the information that one must display. A TV camera can transduce an amazing amount of information, but it is clear that one can't convey with any known techniques all of this information at the rate that it is transmitted from television camera to a blind person. The question then becomes how to abstract it so that it is within the capabilities of the remaining senses.

This conception of a visual prosthesis has greater "general purpose" potential than, for example, a special purpose mobility aid that detects obstacles. A general purpose aid that attempts to present all the information present has many advantages, for in the mobility situation the input is so unconstrained that it is extremely difficult to make any sort of special purpose device that would work in every situation the user would encounter.

I have serious doubts about finding very many cases in which the needs of the sighted are similar to the needs of the blind, as suggested by Dr. White. I suspect that in most cases at least some sort of "thing-to-thing" converter (for example, an optical-to-tactile-converter, or optical-to-auditory converter) would be needed, and that this conversion would involve another "sensory aid."

One implication that the development of tactile displays and auditory displays could have on evaluative procedures is that new kinds of materials to use in the testing process are possible. In the tactile realm, instead of blocks or peg boards the technological possibility exists for complex dynamic tactile displays to be made available. Tactile displays could consist of, for example, hundreds of tactile stimulators in a small array, in which moving patterns could be displayed. A second implication is that technology could offer an interactive aspect to new evaluation materials. Computer technology, for example, offers the possibility that the next test, the next question, or the next stimulus, could be a function of the subject's or user's previous response.

Besides potential solutions to the reading and mobility problems, the advent of computer technology may offer an even greater benefit in making interaction between a blind person and a very complex information storage facility possible. The impact of the computer may open up a new area for sensory aids, one that would be very useful for education and testing.

There are four questions that we could discuss, therefore, regarding sensory aids and the evaluation process:

The first is that on which I have been commenting mainly, "How do you evaluate a sensory aid?"

A second is "What implications do sensory aids and technology have for evaluating the capabilities of blind people?" (I have suggested that technology might at least offer new kinds of materials to use in testing).

The third question is "How should blind people be tested to prescribe sensory aids for them?" It is clear that most sensory aids that are developed won't be universal aids. They will be useful to some people and not useful to others. How do you evaluate a person to predict whether a particular aid will be useful to him or not?

Finally, how can a man/sensory aid system be evaluated to estimate how much good the aid is doing him? After one makes a prescription, and has decided that a person could use an aid, how can one then examine the man/aid combination to decide to what extent it enhances his capabilities?

Some Issues Concerning the Use of Standard Personality Tests with the Blind

Phyllis N. Hallenbeck

The use of standard personality tests with the adult blind raises some issues from both theoretical and practical standpoints which merit our consideration. It is the purpose of this paper to suggest some of the problems involved, and to discuss them, at least in brief. The paper is not meant to be exhaustive, and is not likely to solve any of the problems discussed.

The first issue I suggest is that of the composition of an adult blind group in terms of its homogeneity-heterogeneity dimension. This matter directly affects the development of norms for the blind on any standardized test, as we must be careful about appropriate matching of populations.

For any standardized test we customarily allow for sex differences (if any) and age differences in our population. It has become increasingly apparent that distinct socioeconomic differences may also make generalizations from one population to another inappropriate. With the blind, however, we have at least two other points for consideration before we can assume homogeneity for the population. One matter is the adventitious vs. congenital onset; the other is the degree of residual vision.

Neff and Weiss have said (1965, p. 789):

> *We must distinguish between the consequences of a congenital impairment or one that takes place in early childhood (e.g., cerebral palsy, idiopathic epilepsy, mental retardation, and childhood schizophrenia), and a disability which makes itself manifest after the individual is an adult. In the one case, we are dealing with a set of factors which may powerfully affect the developmental process, so that the individual may grow into a very different sort of person from what he otherwise might have been. In the second case, we are dealing with the sudden, or gradual, disruption of what may already be a stable set of intrapersonal and interpersonal arrangements. This distinction between the possibly quite differing consequences of early and later traumata is one that needs to be kept continuously in mind in our endeavor to conceptualize the psychological aspects of disability.*

We do not know the many ways in which the adventitiously and congenitally blind differ. It has also been pointed out that adventitiously blinded persons have previously been *sighted* people, and must struggle with the beliefs and feelings about blindness which are carried over from the former period of

their lives--in addition to all the feelings which naturally follow the onset of blindness. We might speculate that the imagery of the adventitiously blind is more like that of the sighted than that of a congenitally blind group, while the tactual and kinesthetic senses of the congenitally blind are much more relied on by them to explore their world. How do these and other differences affect responses to personality tests, for example, projective techniques offered through the tactual modality?

As for degree of vision, since the term "legally blind" may encompass individuals having travel vision (for example, able to get about without cane or guide in daylight) to those having total blindness or mere light perception, we are dealing with very different populations at the two extremes of the distribution. Again, we can not specify exactly how they differ psychologically. It is only apparent that "the blind" cannot be considered a homogeneous group in this respect either.

Aside from these theoretical considerations, there are practical problems following from these differences. If we wish to use a projective technique presenting objects to the subject for naming or identification, for instance, do we occlude the partially sighted, or screen off the items, to force them to use only their tactual kinesthetic senses as the totally blind must do? If we blindfold them, do we assume that the blindfolding itself has no emotional effect which may affect their protocols? If we allow them to inspect the objects visually, do we compare their protocols with norms of the sighted rather than those of the blind? These questions emphasize that there are not only psychological differences, but actual physical differences between the two groups affecting the administration of tests.

Another of the important issues to be raised is the reason for a request for evaluation of a blind adult. It has been pointed out (Sussman, 1965) that rehabilitation counselors generally operate within a psychosocial structure which is patterned after the business-management model. That is to say, the orientation is basically economic, because the goal is return of the client to a useful position in the economy. This framework is quite different from that of clinical personnel involved in rehabilitation. As Nagi says (1965, p. 111):

> *Employment is not necessarily the goal for all admissions. Rehabilitation for self-care and the performance of other non-vocational roles are considered equally important, and people are frequently admitted to these centers with the purpose of attaining such goals. In these settings, providing the needed services becomes an end in itself, and accomplishments are not measured in economic terms.*

Nagi then asks what effect this basic difference in orientations has on the ability of the two groups to communicate and work together. He further points out that, in the very nature of the situation, referrals from economically oriented agencies to clinically oriented agencies are likely to be "problem cases."

This point of view would suggest that personality test results wanted by rehabilitation counselors should report accurately the aspects of personal abilities* which are relevant to securing and holding a job. It is well known that vocational potential or achievement is only part of the story, since an employee becomes part of the interpersonal structure surrounding his job and must cope with all the problems which are inherent in this. Needless to say, getting along with co-workers, and accepting orders and criticism from superiors, are abilities essential to employment.

If it is the "problem cases" which are referred for further evaluation, we may surmise that a questionnaire or inventory-type test may not give the information we need. We want to assess those parts of the personality which are inaccessible to self-report or direct questioning. We want to understand the dynamics underlying the behavior in question. We may have specific questions to answer relative to the presence of psychosis or suicidal tendencies. We may be given the task of explaining why the client is not adjusting in spite of rehabilitation efforts, or what would motivate him to do so. An approach to these deeper levels of personality functioning involves projective techniques, as most examiners agree.

It has been suggested (Hathaway, 1965) that the manpower shortage in the mental health field makes projective techniques "far too costly in professional time" for first evaluation of clients. But for evaluation in depth, many examiners would hold that there are yet no satisfactory substitutes for the old, well-used tools of assessment. So we are, like it or not, faced with the problem of finding or building projective tests which can be used with the blind.

I would like to raise the issue of why, in the face of this need, with one or two possible exceptions which show great

*Goodenough (1949) has suggested that, just as in intelligence testing we test the subject's ability to perform certain mental tasks by presenting them in order of increasing difficulty, so also should we investigate personal social functioning. That is to say, instead of trying to measure existing tendencies to certain kinds of behavior, we might rather measure "the ability to respond to changes in the external situation by appropriate changes in mood. . . the ability to dominate, the ability to 'come back' after painful or disturbing experiences, etc." She granted that this would not be easy (to say the least!).

promise, no projective techniques are available for work with the blind, complete with norms, scoring methods, and thoughtful hypotheses proposed for interpretation. Since there is little question that the Rorschach holds an important place in the clinician's battery, a consideration of the history of its development may give us some clues.

Hermann Rorschach is said to have experimented with over 100 ink blots before choosing the final 10 as those calculated to give the desired results. He validated his findings and predictions by matching them against knowledge gained from treating the patient. He developed ways of interpreting the protocols along several dimensions, and suggested scoring to lend a quantitative aspect to the test. His untimely death interrupted the developing work, but within a few years, it was resumed on this continent by Beck, Hertz, and Klopfer (among others) who worked earnestly and independently to make the Rorschach more manageable and more meaningful. It should not be necessary to labor the point that some of these workers have devoted a professional lifetime to furthering the Rorschach. I believe the point is that tremendous effort and devotion is necessary to the development of *any* new projective technique. We should take note that new techniques which show promise, such as the Palacios' Sound Test, undoubtedly do so because of the unceasing dedication of the workers.

The Lebo and Bruce article of 1960 mentioned a number of projective tests of personality which drew upon the tactile sense for response. This is such an obvious way of presenting material of any kind to the blind that clinicians faced with evaluating blind adults in depth must have greatly rejoiced to hear the good news. But what, in these intervening eight years, has happened to these techniques?

One "mystery," at least, can be cleared up. The Avon Three-Dimensional Apperception Test has been dropped, apparently, without further development of its potential. Even before the Lebo and Bruce article appeared, communication with Jacob Levine elicited the following reply:

> *In answer to your letter of August 18, 1957, I am sorry to say that none of the material about which you speak is available. I have not worked with the blind for many years and have not pursued the original preliminary work done at Avon.*
>
> *I am sure that this is a very promising field of research.*

The Bas-relief projective technique of Harris (1948) has been mentioned several times in literature on personality testing of the blind. This test was designed to be scored and interpreted much like the Rorschach, and originally consisted of 22 fibre and wood plates, with raised designs constructed of various materials. In 1948, Harris published a description of

his research up to that time; then no more was heard about it. Just nine years after the article appeared, a personal communication established that no full sets of plates were available and that, in the author's opinion, duplicate sets would be too costly to have made up.

The story of these two promising techniques, both of which were developed with the blind group in mind, suggests that certain major problems in the development of any technique must be solved before it will become an accepted test. One of these concerns scoring, as some shorthand method of condensing wordy protocols into meaningful data is a necessity in personality research.* Another concerns availability and standardization of the stimuli--the test itself. For tests using printed forms of verbal material (such as sentence completion techniques), duplication is not a problem. Electronic reproduction for recorded auditory stimuli make manufacture a simple matter, if somewhat more expensive. However, as the stimuli (test materials) get more complex, duplication becomes more difficult. Different sets of Rorschach cards frequently show minor variations in color and minute detail. When the test materials must be moulded or carved and have several dimensions, the reproduction becomes difficult, and expensive, indeed.

One of the problems in projective tests, other than ink blots, has been to find something akin to *color* as a determinant. I now raise the question of whether variations in the *texture* of solid pieces might give us an added dimension in evaluation.

One such technique (Smith and Madan, 1953), not generally known about in this country, is the Smith-Madan projective test, developed in England in the 1950s. It consists of 10 three-dimensional objects of assorted size, shape, and material, with added textures. Stimulation of the tactile senses is achieved by composition (porcelain, both rough and glazed, wood, rubber, and even wax), by bristles imbedded in the piece, and by coating one piece with grease and presenting still another piece wet. Perhaps such variations as bristles, waxiness, wetness, greasiness, sponginess, roughness, and variations in weight would give an important additional factor with which the subject must cope and integrate into his responses.

The Smith-Madan projective test, or one like it, would give the opportunity of exploring a new dimension in personality testing. Incidentally, it also solved one of the practical problems; although designed for sighted people, it was given behind a screen so that the subject could use only his

One of the primary criticisms of the original auditory projective technique, the "Tautophone," was its cumbersomeness in scoring and interpreting.

tactile-kinesthetic senses in responding to the stimuli. A personal communication with the senior author in 1957 indicated that he planned a new set of objects which could be more easily manufactured with no differences between one set and the next. Unfortunately, no more has been heard of this effort.

It would seem that the disappearance of tests which at first appear to show great promise is due to one or more of these factors: lack of feasible scoring methods, impossibility (or high cost) of exact reproduction, and lack of dedication and determination of the worker(s) involved.

But if we are saying, in effect, that a tremendous amount of effort is needed to develop a personality test to the point where it will be useful, then the issue of *what* personality test deserves such effort is raised. As long as there are independent researchers devoted to a particular test, the question is answered; for them it is their own test. But if any agency, private or government, were to finance the development of a test for the blind, the question still stands. Should it be an inventory type or a projective type of test? If an inventory type, should it be empirical or factor/analytical? If projective, should it be auditory or tactile or sentence completion? Do we know anything which would help make such decisions?

Perhaps we ought to start by considering what clinicians think they need most. This might entail a poll, or survey, of those who work frequently with the blind. Such a survey ought also to assess what the disadvantages and advantages of available tests are felt to be.

The information gathered by a survey might point clearly to an existing test as one which uniquely and adequately fills the demand, and in such a case the problem would be solved. But if not, then a new test, or combination of existing tests, may be in order.

I have suggested that something to substitute for color (as in the Rorschach) would be valuable, and if this is true it complicates the development process, since it is a good deal more difficult and time-consuming to add a whole new dimension to a test than to work with well-known dimensions.

There are articles in the literature which could be utilized to decide certain of these issues. Goodenough's discussion of "sign" versus "sample" in test construction would be relevant to the standardization of such a test, and suggests certain issues bearing on the inventory versus projective argument (Goodenough, 1949). The work on degree of ambiguity of stimuli would also have implications were a new projective test to be constructed (for example, Epstein, 1966; Kramer, 1962; Kenny and Bijou, 1953). Something is now known about the relationship of ambiguity to productivity of meaningful responses, and this information should be used.

Practical aspects of projective tests, such as ease of reproduction of the test by the manufacturer, the resulting cost, how it may be administered without getting into problems of blindfolding partially sighted persons, and so forth, should also enter into consideration. It would behoove us as a group to make some decisions relevant to these matters so that appropriate action may be taken.

REFERENCES

Epstein, Seymour. "Some Theoretical Considerations on the Nature of Ambiguity and the Use of Stimulus Dimensions in Projective Techniques," *Journal of Consulting Psychology*, 30: 183-92 (1966).

Goodenough, Florence. *Mental Testing*. New York: Rinehart, 1949.

Hathaway, S. R. "Personality Inventories," in B. B. Wolman (ed.) *Handbook of Clinical Psychology*. New York: McGraw-Hill, 1965.

Harris, W. W. "A Bas Relief Projective Technique," *Journal of Psychology*, 26:3-17 (1948).

Kenny, D. T., and Bijou, S. W. "Ambiguity of Pictures and Extent of Personality Factors in Fantasy Responses," *Journal of Consulting Psychology*, 17:283-8 (1953).

Kramer, H. J. "Stimulus Variables in Auditory Projective Testing," *American Foundation for the Blind Research Series #9*, 1962.

Lebo, Dell, and Bruce, Roselyn S. "Projective Methods Recommended for Use with the Blind," *Journal of Psychology*, 50:15-38 (1960).

Nagi, Saad Z. "Some Conceptual Issues in Disability and Rehabilitation," in Marvin B. Sussman (ed.) *Sociology and Rehabilitation*. American Sociological Association, 1966.

Neff, W. S., and Weiss, S. A. "Psychological Aspects of Disability," in B. B. Wolman (ed.) *Handbook of Clinical Psychology*. New York: McGraw-Hill, 1965.

Smith, F. V., and Madan, Sillook. "A Projective Technique Based on the Kinesthetic and Tactile Modalities," *British Journal of Psychology*, 44:156-63 (1953).

Sussman, M. B. "Occupational Sociology and Rehabilitation," in Marvin B. Sussman (ed.) *Rehabilitation*. American Sociological Association, 1966.

Discussant: Warren M. Brodey

Note to the reader: Unedited. Typed directly from audio-tape. This statement will be most meaningful to the reader if he can stand to read it aloud with feeling. Otherwise, consider it to be taken out of context--The author.

If the people in the ghetto feel themselves powerless and they would like to have more power, I think I share with some people here a sense of powerlessness in terms of doing anything that makes a difference for blind people, and maybe for sighted people. Because, you see, I think that many sighted people are much blinder than the blind people. What upsets me most of all is the amount of deadness that seems to be in the American style at a meeting of this sort. How our people sit on their asses, trying their best to take in information, but by and large listening to the same kind of crap that they have heard over and over again and not even objecting to it. That I find most unfortunate. We have here at this meeting people who represent the various fields of endeavor who if given half a chance would each protect their own field of endeavor against the attack of the other fields, without necessarily finding in that experience much except some charged emotion, not much enlightenment, because all they are doing is saying the same old things that they always say when they come together with experts who happen to take a different point of view. So you end up with garbage. Now, I, at the same time am very much aware of the fact that sitting around a table like this, in this nice square, in a square room at the top of a square building, you sort of get squared, double squared and you know you can take that wherever you want to. Such squaring sort of is what happens. What I mean by squaring is that you get trapped in a perspective which is a formal perspective which one is supposed to have at such meetings, where for one thing you don't talk like I do, because that's not nice, it's not polite. Except after a while you get fed up with being polite when essentially it means that you have to swallow so much garbage. Now, it so happens that I personally would like to be angry with everyone here, except I can't be, because I am one of you; and if I'm angry at you then I have to be angry at myself, and then I get depressed and I'd rather not get depressed because it's not very useful. Now, what would I get angry about at you, or at me? It's sort of the lack of interaction that occurs in this kind of a situation. You know this Viet Nam War bit. I have to bring that in too. Let me simply say with regard to the Viet Nam War bit that most people are aware of the fact that the Federal Government doesn't want it, the local government doesn't want it, the people don't want it, the Vietnamese don't want it, nobody wants it, but somehow we are dropping bombs just the same, and everybody talks about "well, there is no way to back out of it and save face." There is no way to do anything

and save face. There is no way to capture a few bombers to sort of, to translate into money that we might use for helping with the transit problems that we in this room are all interested in. I mean by that, that in some ways the sickness in this country and the sickness among us here is the sickness of sort of feeling constrained to do things in the right way, and to say things in a way that they have always been said, and to turn off, in your usual way of turning off, which is essentially to sit and accept and to passively listen and take it all in, and then to sort of gobbledy-gook among yourselves, and myself because I'm one of you, and then wish after you left that you had found something more interesting to do, and then complain, and then maybe in the last half hour there will be something to rationalize about (Oh, we did accomplish something) and maybe not. Now, I don't know why it upsets me so much to see people who I respect captured. Captured in a way that everybody kind of knows about, but nobody does anything about because they don't know what to do. I think very much of some of my own family at large, who went into the gas chambers in Germany while people sat and said, "well, what can we do? You know we can't do anything against the government, and more than that, we as individuals can do nothing." This kind of inaction is what has been going on in the ghetto situation. It isn't as if one doesn't want to be useful or do things that are helpful. But somehow there is no way to do anything. And, it's this powerlessness that I feel here in this group, and wish that I didn't feel, and feel just the same even though I talk about it. And so I talk about it anyway, because maybe it gives me a feeling that I might by the end of this short time have something--at least allow other people to share this sense of hopelessness. And where is the hopelessness? You know I don't come by this lightly. I'm not talking just as someone who hasn't been in the field. I've worked for seven years at the School for blind kids. Those kids taught me a lot. They changed my whole life. These are multiply--I don't care what you call them. They are kids who are blind, some partially blind. They are called all sorts of names. They are called schizophrenic, they are called retarded, they're called everything; you just name it, they've been called it. We took the kids who were from the bottom of the barrel, some time ago, and we just tried to work with them to see what we could accomplish. We've accomplished a fair amount, but that isn't what I'm here to tell you about. The way we've accomplished what we've accomplished is by giving up as much as we could, the kind of organization, the kind of design and of plannings, that everybody touts in this community of ours. You know the kind of planning that goes into schools, where the kids sit down at 9:00, or 9:30, or 8:30, or whatever it is, and eat at such and such a time whether they are hungry or not and they live in a way that is competent and well organized; and finally if they are lucky they will be successful and

maybe they will become successful people, in the sense of being alive, or maybe they will be successful plastic people. Now, among the blind people I know there are some who have had most of their guts torn out of them in the process of being taught in schools for the blind. And I mean by that. . . again I don't speak of this lightly, I have for four years, while I was in Washington in practice, I paid a group of blind people to come and teach me about blindness. This is something I wanted to know about; and some of you may have heard of this, I haven't written much about it. But a group of eight blind people who were all very bright, from Georgetown University, because those were the ones who were verbal and I could interact with, came usually once a week and sometimes every two weeks, I'd say to them: "You were traveling down the street today--how did you manage? I don't know how you manage. I close my eyes and I bump into something. I'd be in a terrible mess. How did you manage?" And by and large over a matter of four years we got a little bit of language together, not very much. Most of them had experiences which I still couldn't encompass in any way. But I did learn about the fact that another world existed. That I didn't know about. And that many worlds exist that I don't know about, and that we couldn't examine scientifically as long as we are completely trapped within a particular, to use my big word, epistemology. In other words, as long as you are trapped within a point of view that doesn't allow you to see the other person's point of view, you've had it. And you can be as ritualistic as you like. This morning, for example, in listening to the psychologists, you know, the ritual, the sort of religious ritual of the scientist who is not a scientist at all, who is essentially following a bunch of recipes in order to come up with something which usually is irrelevant, but true, so you can write about it for a Ph.D., which is usually the way in which most of the research gets done, which is what was mentioned in this article. And you get your Ph.D. and then you forget about the research, because the research was essentially for the purpose of getting a Ph.D. Or the clinician, whose main job is satisfying the state office of something or another, rehabilitation is the number of people that finally he gets into jobs. And whether he likes it or not, he is trapped into the system. This is what I want to make clear, I think that we as a group--me anyway--we get trapped every so often. And once we are caught you start justifying what you know is miserable, what you know really doesn't work, what you know is a travesty; but you get trapped and you start to justify it. You know it stinks and you feel lousy inside. Well, I think this is the business of the ladies getting up at the meeting for the retarded, I forget the meeting--up in Boston it was, exceptional children or something--and saying, you know, how great we are you ladies and you gentlemen, and the State Governor and everybody else, you know, is so great, because here we

are saving these kids from the bottom of the barrel, and I can remember myself in the early days saying about the same thing. And this was with a sense of church-y self-righteousness in the bad direction. And yet, we say, after all how else is a meeting supposed to go. You always start with a talk like that, and that's the ritual. And you are right. That is the ritual. And that's the ritual we all follow. We follow it here too, for that matter. And you know, you need rituals. You need rituals in order to simplify things so everybody knows that madame chairman or mister chairman gets up, and you speak, and you have your ritual. I've found that my work with the blind kids decided me that I couldn't stand sitting and listening--I had a psychiatric practice and I just couldn't stand listening to people yak at me about their wives or husbands and so on and on, so I just took off and went to MIT to work. Now I talked about the clinicians and I've talked about the poor psychologists and the poor clinicians, and I'm in the dock, because I've been sort of one of all of them; and now I'm going to talk about the "scientist." You know, for a moment this afternoon, I said, Oh yeah, here are my people talking now, and they don't come from the other side of the tracks, like the people who were there this morning. I'm on the new side of the tracks now, with the modernists, with the guys who are going to change the world. And then I start to remember the fact that Jim Bliss and other people that I know could be talking about the same things for a long time. They have gradually gone ahead--and I'm not talking about you, I'm talking about what I saw when I was working in what I called the ward, the laboratory where they had all these machines around. Where there was the promise, always the promise, of what we are going to do tomorrow for the blind people. We were going to change everything, and that promise, by and large, does come off, but it is so slow and it's so irrelevant to the clinical problems that you have to deal with today and it's so irrelevant to the fact that here's all this money going into it, and here are these people who don't have that thousand dollars which would make a big difference, and yet half a million is going into this piece of research by a bunch of Ph.D. students who are trying to get their Ph.D.'s. So I guess what I am talking about is. . . let me go the next step. I've already left MIT on April 1st, and have been fortunate enough to start my own laboratory. I could be talking just as well about (the fact that) the great things that we are going to do in the future for the blind people, and for the sighted people; we are much more ambitious than some people are, and for the children who when they enter school are already being trained out of their perceptual skills. But I don't think that necessarily is useful, maybe it is. The one thing that I'm so awed with, that seems so important to me is the passivity of being turned off, which is about where most people are. You've learned so well to learn by sitting and

learning the symbolic things, and then the experiences at home and so on you put in an entirely different category, and part of the psychological testing and so on is the effort to lift what is personal to us into something that is technical. In having sort of espoused a way of life, which is so much more of sitting and just sort of taking it all in, and being part of what goes on in this sense. We have lost our awareness of the intellectual values as for the technical values are concerned. I'm using Ed Hall's words. He goes from the informal, which are the frames of reference that you don't understand. They're so automatic that you really don't perceive them, and this is also recognized traditionally: how other people talk about the world, the invisible world around us, which is so automatic that you have no sense of its meaning. The blind people more than anything else taught me about the world that is so automatic that I didn't even know it was there before: the world of echoes, the world of different densities of sound, the world of interference. Walking down the street, and how the different sounds and different heat radiations, and all these things, how these manifest themselves. Only yesterday, I was sort of trying to build in my laboratory a space that had certain kinds of qualities, and I knew from the way the blind people had taught me that I couldn't build that space as long as the acoustical qualities of the space were thus and so. Now we have in our laboratories, a CDC 200 computer, an averaging computer, and the reason for that being there is just to help us to try and work with the kind of interaction that occurs in everyday life. We are not trying to be technologists in the full sense, but what we are trying to do is to work on the conversation between a person and another person, and a person and his environment, where both the person and his environment are interacting momentarily, each with each other and at the same time, in parallel. I speak to you and I speak in terms of your responses to me even as I speak. We cannot separate the cause and effect, really, when we're coming down to the delicate affairs that are involved. We cannot separate subjects and objects. There is no way to be objective and to be a significant, none whatsoever. You can be significant in terms of gross things like whether somebody is living or dead. But when it comes to the fine-grained kinds of information exchanges that we should be interested in, given the level of sophistication we have about us, you have to change your whole point of view. The experimental method is changed, because it is possible to program the computer so that it changes the experiment with many, many variables all at once, in midstream, while the experiment is going on. Real time information processing changes the whole environment. My own work in the laboratory is working and trying to define real-time experimentation. So that we may be able to . . . not so much change everything, as to find a way to talk about that which is informal,

that which all of us use every day in order to interact with each other, in order to stay alive. To talk about turned on things instead of having it talked about by the hippies, or by the people who are doing it in strange ways. We want to talk about health, we want to talk about being able to enlarge the horizon of a human creature so that, for example, a child lives in terms of his potentiality instead of having to be slowed down to teacher rate as soon as they end up in fifth grade. You watch it happening and it's sad and you don't know what to do about it. That's the way I feel about it anyway. So these are some of the things that are on my mind, and I think Phyllis Hallenbeck, when she spoke about how personal dedication seems to be the thing that carries, more than intellectual dedication in the sense of being right, and being able to prove, and the like. Being able to prove being right and all those things are important, but relevance is by far the most important aspect of science, and it seems to have gotten lost. I believe that with our new technology, if we can move together the people with technology, the people with a background in science, you might say, clinical people, we have something to do together. But I don't know how to do it, I am not even sure that it can be done with the people here. But I do think among the people here there really is enough power to be able to develop a significant program, or help it, if we would only share with each other our frustrations, rather than pointing with pride to developments which we know within the framework of requirements are so many.

New Developments in the Intelligence Testing of Blind Children

Carl J. Davis

Introduction

The origin of the development of intelligence testing of the blind has important implications for a review and critique of new developments in the measurement of the mental abilities of visually handicapped children. In 1913, S. C. Kohs was assigned by Dr. H. H. Goddard of the Vineland Training School to work with Robert Irwin in an attempt to translate the Binet-Simon Tests of Intelligence into tactual dimensions. (From that experience Kohs developed the interest that resulted in the Kohs Block Design Test) (1). In 1914, the initial form of an intelligence test was produced by Irwin and Goddard (2, 3). Haines followed in 1916 with an adaptation of the Yerkes Point Scale that incorporated tactile substitutions for visual tasks (4). In 1916, Hayes began routine testing at Perkins and other schools using the Irwin-Goddard tests (5). That work led to the development of his "Scissors and Paste" adaptation of the 1916 Stanford Revision of the Binet-Simon Tests of Intelligence (6), and in 1930 the *Condensed Guide* for his adaptation of the Stanford Revision of the Binet-Simon tests was published and became popularly known as the Hayes-Binet (7, 8). Later, in 1943, he produced the Interim Hayes-Binet Tests of Intelligence which were adapted from the 1937 Stanford Revision of the Binet-Simon Tests (9).

Meanwhile, in 1915, in England, Drummond had tried to stimulate teachers to assist in the "arrangement of a Binet-Simon Series" for the blind (10). With their aid he produced in 1920 *A Binet Scale for the Blind* and *A Provisional Point Scale for the Blind* (11). These became the standard tests in use in England, Scotland, and Wales. Later they were translated for use on the continent, and one translation has seen fairly recent use in Germany.

In 1942, following the suggestion of the author (12), Hayes recommended the use of the Wechsler-Bellevue Intelligence Tests, Verbal Scale (W-B), as an alternative method of measuring the mental ability of the blind (13). These tests began to be accepted for general use by the late 1940s. As later versions of the Wechsler tests were published, their verbal scales were rapidly put into use. It is important to note that Hayes did not make item analyses of his adaptations of the Stanford Revisions. In his revisions and in the use of the Wechsler tests, item scoring was not changed essentially from the procedures for the seeing, and intelligence quotient norms were those developed on seeing populations.

Reports of Research with Current Intelligence Tests

Denton compared the performance of 56 pupils on the Interim Hayes-Binet (IHB) and the Wechsler Intelligence Scale for Children (WISC) at the Halifax, N.S., School for the Blind (14). In addition, a comparison of performance on each test was made with teachers' ratings of intelligence. Both sexes were represented in the sample, with an age range of 6 to 14 years. Denton suggests that the IHB is the better test, because it correlated best with teachers' rating (r = .51 vs. r = .39 for the WISC). The difference between the means was small: 81.5 and 79.6 for IHB and WISC, respectively. However, the percentage distribution of IQ's must be considered:

Test Group	*Percent*
mentally defective	18
borderline	32
dull normal	23
normal	21
bright normal	4
superior	2

Thus, the skewness of the distribution of the sample casts doubt upon the validity of the author's conclusion.

Gilbert and Rubin used a group of 30 subjects to compare the IHB and the WISC (15). The age spread was 6 to 14 years, and there were 8 males and 22 females. The mean IQ's and standard deviation for the IHB and WISC, respectively, were: 75.4 and 14.95 vs. 78.5 and 17.8 (the differences were not significant). It is interesting to note that the SD's were in an order of magnitude--that is, the inverse of what one would expect to find with a group of seeing subjects. In addition, the means strongly suggest that the sample is an atypical population. Yet the authors, for subjective reasons (that is, ". . . many handicapped children cannot continue comfortably over such a period of time as required by many of the Hayes-Binet tests. . . ."), suggest that the WISC is to be preferred as a test for blind children. The validity of the argument that the Comprehension and Similarities tests of the WISC may be inappropriate for the blind is weakened by the selective nature of the population.

Hopkins and McGuire compared the IHB and the WISC using a population of 30 congenitally blind children (all blind due to retrolental fibroplasia) (16). The age range of the group was 9 to 15 years, with a sex distribution of 18 boys and 12 girls. The mean IQ's and SD's for the IHB and WISC, respectively, were: 118.5 and 22.7 vs. 110.0 and 16.0. The difference in the IQ's (t = 3.83) was significant at the .001 level. Variance and reliability are discussed as an argument that the tests are not interchangeable. The difference in IQ scores is similar to that reported by Hayes (17). Once again, poor performance on the Comprehension test was demonstrated. The authors caution users

to be aware of a marked lack of interchangeability between the IHB and WISC scores. In this instance, a sample of questionable statistical validity (due to age range) is used for a firm generalization. If a population of adequate size and age distribution had been used, a regression equation could solve the interchangeability problem. Also note the diagnostic selectivity of the sample.

In another report Hopkins and McGuire discuss IQ constancy within the same group (18). The scores reported in the earlier study were compared with scores obtained on the IHB on an earlier test, the mean interval between tests being 4.1 years younger. The mean age of the latter test was 12.5 years. Thus mean IQ's and SD's of 105.8 and 16.11 vs. 118.5 and 22.67 were obtained. Consequently, caution in the interpretation of IHB IQ's is recommended in test-retest situations. This growth in IQ was reported by Hayes (17), and it is familiar to all experienced examiners of blind children of the age ranges indicated.

Tillman reports on two studies with the WISC involving 55 blind boys and 55 blind girls compared to a similar group of seeing subjects (19, 20). The groups ranged from 7.0 to 12.92 years with equal means of 9.9 years. The mean IQ's and SD's of the blind and sighted respectively were: 91.95 and 14.88 vs. 96.54 and 17.73. The difference in the means (t) was barely significant at the .05 level of confidence. Comparisons of subtests show the blind significantly lower (.001 level) on Comprehension and Similarities. This data supports that presented earlier and it is based upon more sound sampling techniques. Factor analyses intended to compare intellectual characteristics across groups showed fewer factor loadings and weaker communalities for the blind in all areas measured except arithmetic.

In 1966 this reporter made an analysis (unpublished) of scores obtained by students at Perkins School for the Blind who had been tested consecutively by the IHB, WISC, and W-B, Form I, in the normal testing sequence at the school. The subjects' (N = 74) mean chronological ages (CA) at the time of testing were as follows: IHB: 6.7 years; WISC: 11.5 years; and W-B I: 14.2 years. Thirty-nine subjects were girls and 35 were boys. The mean IQ's and the SD's for the IHB, WISC, and W-B I were 101.50 and 16.90, 105.60 and 16.58, 105.15 and 16.58. The difference between the mean IQ's was not significant at the .05 level (21). While the variance appears remarkably similar, one would expect the variance on the Wechsler tests to be less than on that of the Binet type test (12).

Garbe reports on research in intelligence testing in West Germany (22). W. Strehle translated the Binet scale of Drummond and administered it to 144 subjects, 7 to 16 years of age. Rexhausen continued Strehle's work until 325 subjects, 155 blind and 170 partially sighted, were tested. Scores presented by age for each group indicate a developmental progression

with weaknesses apparent at the 6, 7, 9, and 14 year levels. Unfortunately, the sample population size (*N*'s) at each age level in the separated groups were too small to be valid. The progression for the combined groups is smoother.

Garbe discusses a study by Klauer with the HAWIK, a German version of the WISC that had been adapted for the blind. The size of the sample is not reported. The blind achieved higher than the sighted in verbal areas and lower in nonverbal areas. The subtests Vocabulary and Information showed higher results than Information and Arithmetic. Additional unpublished studies using the HAWIK show that the blind in West Germany produce a flat curve similar to that published by Hayes (17), while the partially seeing performance has a distribution that is normal at the mean, but weighted toward the superior range of IQ's.

Recent Research in Intelligence Test Development

In 1956, Wattron reported a brief study that utilized an adaptation of the Kohs block test from the Wechsler tests (23). The blocks, made of one-inch cubes with smooth and knurled surfaces, were assembled in boards with square openings. The subjects were 10 blind boys and 10 blind girls ranging in age from 7 to 17 years, and they were matched in respect to age and sex with a seeing group. The results of the blind group did not differ significantly from the seeing group. There was a correlation of .84 between IHB mental ages and block performance. Recognizing that the group was small, Wattron recommended further exploration of the concept.

In England, in 1956, Williams published the Williams Intelligence Test for Children (24, 25). Since the test was intended to be used with both partially seeing and blind youth it is highly verbal. Most items came from the 1937 Revision of the Stanford Binet Tests of Intelligence. The WISC vocabulary was substituted for Terman's, and for younger subjects a few verbal items from Valentine's Intelligence Tests were selected. A few items were chosen from Burt's Reasoning Tests for older subjects. The test was arranged as a point scale and tried out with a small sample of 120 children to check provisional placement.

Williams' standardization sample consisted of half of the pupils of nearly all of the schools for the blind, and nearly all of the schools for the partially sighted. The following numbers were tested: 299 blind subjects, 379 blind subjects with residual vision, and 241 partially sighted subjects with vision under 6/36 (Snellen). Standardization was carried out for each group with a scale that set a median IQ of 100 and a SD of 15 for each age group. Due to overall similarity of results it was decided to conduct a single standardization, which

resulted in a single test scale. Validity indices range from 50 to 89 and the average reliability coefficient for age levels from 6 to 15 years is .94. Only two performance items appear as test items in the final form of the test. Four non-scored items are retained for interest value. Thus the first test of intelligence based upon comprehensive and analytical procedures was produced. It contains the weakness of a verbal examination, because factors other than verbal ability function in the learning process.

The Kahn Intelligence Tests: Experimental Form (KIT:EXP) were reported in 1960 (26). In this report the author discusses a nonverbal, culture-free test based upon the materials used in the Kahn Test of Symbol Arrangement. It is an age level test with six items at each age grouping. The author suggests a brief form, that consists of only one item at each age level, as useful with the blind. In addition, in an advertising brochure (27) the author states that the test: ". . . includes a scale for assessment of the intelligence of blind persons. . . ." Such a test could yield only a crude approximation of intellectual ability, even though described as "experimental" and producing "only an estimation" (as stated in a footnote to the text). This reporter questions the responsibility of advertising that can be misconstrued.

The only group test reported is Pearson's local norming of the School and College Ability Test in braille and large type in grades 4, 5, and 6 (28). The subjects were 196 blind and partially seeing students in grades 4, 5, and 6 of seven residential schools for the blind. The norms were established on both braille and large type versions of the test. The author makes no sweeping claims for her product, because she recognizes limitations in sampling.

Newland and his associates have been working since 1952 on the development of the Blind Learning Aptitude Test (BLAT) (29, 30). This is a test involving tactile perception and organization independent of symbolization. The test consists of an extensive series of embossed forms of varying complexity and structure, intended to sample the following processes: (*1*) the discovering of differences; (*2*) the identification of identities in several patterns of its manifestation; (*3*) the discovery of relationships with a view to extrapolation in terms of them. These relationships consist of three patternings: (a) a progression in the order of a: b: c: d--what comes next? (b) a major figure or pattern with an identifiable part missing, and (c) four-figure and nine-figure matrices. Memory *per se* is not sampled, and perception is not tested apart from other psychological processes. Verbal adequacy as such is minimally involved. Verbal instructions are employed, but vocabulary demands and communication are minimized.

In 1961, Rich and Anderson conducted a study using the experimental Children's Tactual Progressive Matrices (CTPM) (31, 32, 33). The items were taken from Raven's Coloured Progressive Matrices: Sets A, Ab, and B. Each item consists of a ground with a raised design, so that it is tactually perceptible (the matrix), and six pieces with raised designs (the inserts). There is a part missing from each design, and it is the task of the examinee to find which of the six inserts complete the analogy in the design. There are 36 designs, and the item difficulty is progressive.

The subjects were 115 blind residential and day school children ranging in age from 6 to 15 years. The largest group at a specific age level was 23, and the size of age groups ranged downward to 2 at the six-year level. The sex distribution was 61 females and 54 males. Subjects were permitted to use vision if they desired to do so. All 36 items were administered to each subject unless there were five consecutive errors in a set, in which case the subject did not complete that set.

The subjects were clustered into three 3-year age range groups. Mean differences between groups were significant at the .01 level. Correlations indicated moderate homogeneity. Correlation between the CTPM and WISC test ages was .53, and correlations between CTPM and WISC subtest raw scores ranged from Similarities, r = .24, to Comprehension, r = .40. Percentile norms are given, but they are to be taken as only tentative. The average scores were much lower than the average scores of seeing children. The items were too difficult for children 11 years old or below, but of satisfactory difficulty for 12-to-15-year-olds. There was no significant difference between sexes. The results of this study are not sufficiently conclusive, because the population at the various age levels was too small. Yet the results indicate that a continuation with adequate sampling is justified, and it may add another test to the limited number available.

Davis has completed the standardization of the Perkins-Binet Tests of Intelligence for Blind Children (34). The tentative form of the test was administered to 2187 subjects in residential and day school programs from Massachusetts to California. There was a minimum of 200 subjects at each age level from 5 to 15 years. In each school setting, one-half of the blind pupils and one-half of the partially seeing pupils were administered the test in two split-half sessions (Forms A and B). One-half of the girls and one-half of the boys were randomly selected in each group in each school setting. The tentative forms consisted of 135 items, primarily from the 1960 and 1937 Stanford Revisions of the Binet-Simon Tests. Approximately one-fourth of the items were nonverbal. Two items were taken from the Williams Intelligence Test and several were from the Hayes-Binet (1930).

An item analysis was made following the procedures used by Terman and Merrill, described by McNemar (35). From the data two final forms of the test were established; Form N for blind subjects without usable vision, and Form U for blind subjects with usable vision. Each form is an age scale test with six items at each age level, from age IV on Form N and age III on Form U up to a top level of XVIII. There are 95 items in Form N and 99 items in Form U; 73 items are common to each test. Form N contains 23 nonverbal items and Form U has 33 nonverbal items.

An analysis of the age placement of items on the Perkins-Binet, compared to the placement of the items on their original test, yield interesting data. On Form N, 13 items were at the same level as on their original test, 15 items were at a lower level than on their original test, and 67 were at a higher level than on their original test. On Form U, 27 items retained their original test age placement, 15 items were at a lower level than on their original test, and 57 were at a higher level than on their original test. In a similar vein, a comparison between forms shows that on Form U, 38 of the common items are placed higher, and 22 of the common items are placed lower, than on Form N.

Following the item analysis the protocol data was restructured to coincide with Forms N or U as appropriate. Mental ages (MA) were determined and mean MA's per chronological age (CA) were run off. The final result shows a slight plus distortion of mean MA at CA = 5 and 6, and a drop-off tendency of mean MA above CA = 14. The latter is consistent with the Terman-Merrill data.

Discussion

The results of research with nonstandardized tests with blind subjects, and the efforts to standardize tests on the blind through item analysis procedures, seriously question the validity of using verbal tests for the seeing without analysis of content and hierarchal difficulty. In addition, care must be taken to ensure that population size is adequate to ensure statistical validity. When we are concerned about intellectual functioning, we are concerned with developmental processes. Thus a sample of 100 or more, spread over a span of six years bridging childhood and adolescence, does not provide adequate sampling at each chronological and developmental level.

Another point of concern has to do with the use of nontypical populations as a basis for recommending the use of particular instruments or procedures with more general populations. Among the reports presented, three projects were based upon nontypical populations. Yet they were discussed in quite general terms. When one is concerned with learning ability one

must either restrict discussion to the range of function studied, or one must extend his sample to general, typical populations.

REFERENCES

1. Kohs, S. C. "The Ohwaki-Kohs Block Design Test," in *The Proceedings of the West Coast Regional Conference on Research Related to Blind and Severely Visually Impaired Children.* New York: American Foundation for the Blind, 1965.

2. Irwin, R. B., and Goddard, H. H. *Adaptation of the Binet-Simon Tests.* Vineland, N.J., 1914.

3. Irwin, R. B. "A Binet Scale for the Blind," *The Outlook for the Blind,* 8(3):(Autumn, 1914).

4. Haines, T. H. "A Point Scale for the Mental Measurement of the Blind," *Journal of Educational Psychology,* 7(3): (March, 1916).

5. Hayes, S. P. "Mental and Educational Survey in Seven Schools for the Blind," in *Proceedings of the American Association of Instructors of the Blind,* 1920.

6. Hayes, S. P. *Adaptation of the Binet Tests for the Blind.* Mt. Holyoke College, 1923.

7. Hayes, S. P. "The New Revision of the Binet Intelligence Tests for the Blind," *Teachers Forum,* 2:(November, 1929).

8. Hayes, S. P. *Termans Condensed Guide for the Stanford Revision of the Binet-Simon Tests.* Adapted for use with the blind, Perkins Publication No. 4, 1930.

9. Mayes, S. P. "A Second Test Scale for the Mental Measurement of the Visually-Handicapped," *The New Outlook for the Blind,* 37(2):(February, 1943).

10. Drummond, W. B. "Binet's Mental Tests and Their Application to the Blind," *The Teacher of the Blind,* 3(1):3-7 (January, 1915).

11. Drummond, W. B. "A Binet Scale for the Blind and a Provisional Point Scale for the Blind." Monograph from the *Edinburgh Medical Journal,* 24:(1920).

12. Wechsler, D. *The Measurement of Intelligence*. Baltimore: Williams and Wilkins, 1939, p. 138.

13. Hayes, S. P. "Alternative Scales for the Mental Measurement of the Visually Handicapped," *The New Outlook for the Blind*, 36(4):(October, 1942).

14. Denton, L. R. "Intelligence Test Performance and Personality Differences in a Group of Visually Handicapped Children," *Bulletin of the Maritime Psychological Association*, 1954, 47-50.

15. Gilbert, J., and Rubin, E. "Evaluating the Intellect of Blind Children," *The New Outlook for the Blind*, 5, 9, 7, 238-40 (1965).

16. Hopkins, K. D., and McGuire, L. "Mental Measurement of the Blind, The Validity of the Wechsler Intelligence Scale for Children," *International Journal for Education of the Blind*, XV(3):65-73 (1966).

17. Hayes, S. P. "Measuring the Intelligence of the Blind," in P. A. Zahl (ed.), *Blindness*. Princeton University Press, 1950.

18. Hopkins, K. D., and McGuire, L. "I.Q. Constancy and the Blind Child," *International Journal for the Education of the Blind*, XVI(4):(May, 1967).

19. Tillman, M. H. "The Performance of Blind and Sighted Children on the Wechsler Intelligence Scale for Children: Study I," *International Journal for the Education of the Blind*, XVI(3):(March, 1967).

20. Tillman, M. H. "The Performance of Blind and Sighted Children on the Wechsler Intelligence Scale for Children: Study II," *International Journal for the Education of the Blind*, XVI(4):(May, 1967).

21. Guilford, V. P. *Fundamental Statistics in Psychology and Education*. New York: McGraw-Hill, 1956, pp. 185-6.

22. Garbe, H. "Testing Blind Children--Problems and Results," in *Proceedings of the Fourth Quinquenniel Conference of Educators of Blind Youth*. 1968.

23. Wattron, V. B. "A Suggested Performance Test of Intelligence," *The New Outlook for the Blind*, 50(4):(April, 1956).

24. Williams, M. *Williams Intelligence Test for Children with Defective Vision.* University of Birmingham, England, 1956.

25. Williams, M. "The Changing Concept of Intelligence and Intelligence Testing and the Development of the Williams Intelligence Test for Visually Handicapped Children," *Proceedings of the Fourth Quinquenniel Conference of Educators of Blind Youth.* 1968.

26. Kahn, T. C. "Kahn Intelligence Tests: Experimental Form," *Perceptual and Motor Skills,* 10:123-53(1960).

27. Kahn, T. C. *Kahn Intelligence Tests, Experimental Form.* Advertising brochure. Psychological Test Specialists, Missoula, Montana.

28. Pearson, M. A. *Establishment of School and College Ability Test Norms for Blind Children in Grades 4, 5, and 6.* Doctoral dissertation, University of Oklahoma, 1962.

29. Newland, T. E. "The Blind Learning Aptitude Test," in *Proceedings on Research Needs in Braille.* New York: American Foundation for the Blind, 1961.

30. Newland, T. E. "Prediction and Evaluation of Academic Learning by Blind Children: Part 2," *International Journal for the Education of the Blind,* XIV(2):(1964).

31. Rich, C. C. *The Validity of an Adaptation of Raven's Progressive Matrices Test for use with Blind Children.* Doctoral dissertation, Texas Technological College, 1963.

32. Anderson, R. P. *Raven Progressive Matrices for Presentation to the Blind.* Report of VRA Project RD-670, 1964.

33. Rich, C. C., and Anderson, R. P. "A Tactual Form of the Progressive Matrices for use with Blind Children," *Personnel and Guidance Journal,* XLIII(9):(1965).

34. Davis, C. J. *The Standardization of the Perkins-Binet Tests of Intelligence.* VRA Project RD-898.

35. McNemar, Q. *The Revision of the Stanford-Binet Scale.* Boston: Houghton-Mifflin, 1942.

Discussant: T. Ernest Newland

Introduction

I have prepared this paper without having before me the paper to which this is supposed to be a reaction. An addendum is appended which gives some reactions to the target paper. This general problem being what it is logically, I suspect there are some anticipatory relevancies.

I structure my observations primarily with respect to the matter of learning aptitude of blind school children, recognizing that the lower age limit at which the child is receiving, and should receive, serious educational concern is steadily moving below the earlier conventional age of six years, just as the upper age limit of educational concern is getting higher. Perhaps it would be clearer if I were to say that my consideration here will be with that learning aptitude which is particularly involved in the acquisition of basic or general education, as contrasted with the learning aptitude, or aptitudes, which are essential to the adults' learnings in preparing for and holding effectively specific jobs. I believe that this distinction between the perception of learning aptitude in blind students and that of blind adults is crucial from a psychological point of view. In the case of the school child, the outcome to be predicted, or in terms of which the learning potential of the child is to be assessed, is essentially unitary in nature. The major psychological task is the extent to which he can acquire additional symbols, and communicate with others by means of such symbols. On the other hand, the adult is confronted with a variety of tasks which, while necessitating a discernible amount of the same kind of capacity which is so crucial in the learning which children do, calls also for other aptitudes and capabilities.

Parenthetically, two points should be noted here. In the first place, I prefer to think in terms of "learning aptitude" rather than the too-often-ambiguous term "intelligence." In the second place, my use of the term "learning aptitude" may seem to some to reflect no sensitivity to the significant contributions of men such as Thurstone, who identified the primary mental abilities of which "intelligence" is constituted, or of Guilford, who posits some 120 components of "the intellect," or of Spearman, who identified "g" and "s" factors in intelligence, or of Cattell, who has identified "fluid" and "crystallized general abilities" in what has been called "intelligence." So far as blind children are concerned, I believe we can profitably think in terms of a rather "lumpy learning aptitude," although, as I shall bring out later, this can be sharpened in a very useful manner.

I desire here to identify and develop somewhat two major problem areas related to the matter of learning aptitude of blind children, and, passingly, to lament concerning what I regard as a disturbing fall-off of research activity in a major portion of the psychoeducational area since the work of Hayes.

The Perception of What Is to Be Measured

The first major problem consists of the perception of the learning aptitude of the blind which attempts are being made to measure. It will help if we consider this problem in terms of a conceptualization provided us by developmental psychology. While we came by this conceptualization in connection with the area of motor behavior, this way of thinking is logically appropriate with regard to man's reaction to phenomena in the cognitive area.

When man first reacts to any new phenomenon or abstraction, he does so in a mass-like, undifferentiated manner. This applies whether we observe him reacting to Catholicism, the United Nations, evolution, atomic energy, ethical behavior, chemistry, or the generalization called intelligence. The majority of people dealing professionally with "intelligence" still are at this mass stage. All too frequently, our professional literature contains considered allusions to "the IQ's" of children used in studies, statements which reflect no sensitivity to the fact that different tests yield IQ's which reflect different kinds of things, statements which must be taken to imply that "the IQ" is the most fruitful yield of learning aptitude testing. The developers of most of the new, or adapted, tests for blind children tend to suggest that their thinking about the phenomenon they are seeking to measure is at this mass, undifferentiated stage. That this kind of mass-like perception of "intelligence" was characteristic of the early developers of tests of intelligence is quite understandable in terms of our developmental construct, but the fact that this kind of thinking continues as extensively as it does suggests developmental arrest.

Later, man begins to differentiate in his reactions to a phenomenon. Thorndike did this in his perception of intelligent behavior when he broke it down into three categories--abstract, concrete, and social. Thurstone went one step further by differentiating Thorndike's abstract area into primary mental abilities. A similar advance along this developmental progression is the perception of "intelligence" as reflected in the work of Cattell and those working with his constructs. (For background informational purposes, and only to round out the picture developmentally, we may note in passing that integrative conceptualizations, the ultimate stage in the

developmental progression, are exemplified in the work of Spearman and Guilford.)

For our purposes here, and only for descriptive reasons, we should recognize that present attempts to measure the learning aptitude of blind children are essentially at the mass or undifferentiated stage, developmentally speaking. The Binet and the WISC Verbal as used with the blind, especially so far as the results on them are dealt with in terms of total scores, reflect this mass-like orientation. It is unfortunate, particularly with respect to blind children, that the mass-like results obtained by means of such measuring devices contribute to a mass-like kind of thinking about their learning potential.

This should not be taken to suggest that the results obtained by such devices and used in this manner are devoid of psychoeducational value, particularly in the cases of older blind children. In the early development of tests of "intelligence," the assumption was stated quite explicitly that the attempt was being made to measure achievement on the basis of which further achievement might be predicted. There was a very important subassumption here that those whose achievement was being measured had been exposed to comparable--not identical--acculturation. This subassumption has been particularly difficult to satisfy with respect to blind children, even with the adaptations made by Hayes. To the extent that these basic assumptions are not tenable, it is necessary that we seek to get evidence regarding the relative presence of psychological processes which underlie, or make possible, the learning which constitutes achievement. In order to simplify our communication, let us differentiate between "product," which reflects mainly achievement, and "process," which reflects mainly the psychological operations fundamental to learning. (These very roughly parallel Cattell's "crystallized general abilities" and "fluid generalized abilities.")

Illustrations of behavior samplings which reflect product and process will help. The following items predominantly reflect product: "How many legs does a dog have?"; "Who discovered America?"; "Name the days of the week"; "What is a window made of?"; and even, "The cube of 1 is to the cube of 2 as 1 is to (what?)." The child responds to these primarily in terms of what he has learned--knowledge he has acquired. When we consider behavior samplings that involve primarily process, we have a wider variety of stimuli and responses. Take, for instance, a row of five geometric figures--four circles and a square, or four squares and a triangle, in which the child is asked to identify the element that is different, that doesn't belong with the others. The child's solution of this kind of test item does not necessitate his knowing the words for or concepts of circle, square, or triangle. Or take the item in

which the child is presented a circle which is associated with an ellipse and is told that they "go together," that they "belong together." He then is presented a square which is to have something go with it in the same manner that the circle and ellipse belonged to each other. He then has to select from a bank of response elements one of which is a rectangle resting on its long side. Here his capability is sampled in identifying the relationship that exists between the first two figures presented that can maintain also between the third figure and one of those in the response field. Again, he need not know the words with which to denote any of the geometric designs in the test item in order to respond to it correctly. A more complex item such as a simple number series (1, 2, 4, 7, ?) would sample his ability to identify the necessary relationship among the stimulus elements on the basis of which he would then supply the next number in the series. Here, while some product is involved in his reacting to the item, this is essentially a "given" (the number values already have been learned), and the item discriminates among the subjects primarily on the basis of their ability to ascertain a logical relationship. One more example, to push the matter a bit further: Take the item which confronts the child with the task of identifying the commonality among the words; snake, cow, and sparrow. Here, as in the former kind of item, the meanings of the words already are known by the subject and the fundamental psychological demand of the item is to identify a satisfactory commonality or relationship. These last four illustrative items involve primarily the operation of psychological processes which are crucial to learning, or which make possible the acquisition of product. (I am intentionally omitting memory as a psychological process.)

By the admittedly "lumpy" word "process," I seek to denote those psychological operations which make possible all learning, or the acquisition of "product." The terms process and product, in effect, identify ends of a continuum. Rather than thinking in terms of whether behavior samplings involve *either* process *or* product, it is necessary to think in terms of how much of which, and when.

In this light, Binet and WISC Verbal results may be thought of as product-laden, although process also is reflected in performances on these tests. The results obtained by means of adaptations of the Kohs (perhaps) and the Raven (probably) can be seen as more heavily reflective of process than of product. The results obtained by means of the test on which I have been working (the Blind Learning Aptitude Test (BLAT)) can be perceived as reflecting process very heavily.

Knowing well, as we all do, the limited acculturation backgrounds out of which so many blind children come into the schools, day or residential, the importance of getting evidence

on the extent to which process is present is at once apparent, particularly on the younger children. With young children, process plays a large role in making possible the acquisition of product, although product can be helpful. However, as children get older, product tends much more heavily to beget product; although process is not absent, it plays an increasingly minor role.

Social and educational implications of major significance can emerge in terms of this kind of differentiated perception of measured learning aptitude at least of blind children. In connection with some research which will lead to the standardization of BLAT (funded not only by a recent grant by the U.S. Office of Education, but also by the American Foundation for the Blind, the University of Illinois Research Board, and aided by the Printing House for the Blind), I obtained Hayes-Binet, WISC Verbal, and BLAT results on blind children aged 7 through 17 in the state residential schools in Alabama, North Carolina, and Tennessee. Analyses of performances by nonwhite and by white children on these tests revealed, as generally has been found, that above age 9 only about one-sixth of the nonwhites earn Binet mental ages or WISC Verbal test ages above the means of white children. On BLAT, however, the means of nonwhite and white children in this sample show no consistent differences across the age range from 7 through at least 13. It well may be that the slightly higher average scores by whites at ages 14, 15, and 16 could be an artifact. Among these blind children there appeared to be no significant differences between nonwhites and whites when basic psychological process is measured, but differences between them become quite apparent on tests involving the results of learning. As product becomes a factor in reflecting learning aptitude, racial differences become increasingly evident; when this learning aptitude is reflected in terms of process, racial differences are much less, if at all, in evidence. (The *N*'s of the nonwhite samples ranged from 94 to 98; for whites from 225 to 236.)

I should point out that even the performances (not the total scores) on the Binet and WISC Verbal can be studied in terms of process and product, although I believe that this is seldom done.

The Uses to Which Learning Aptitude Test Results Are Put

A second major problem area includes the kinds of things done with, or kinds of action taken on the basis of, the results obtained by blind children on good learning aptitude tests. I have a suspicion that the most activity involving such results is in connection with research. Practically all of this research--in fact all that I have read--is done in

terms of the mass-like perception to which I have referred. This research is essentially psychometric, rather than psychological, in nature. These studies tend to relate to norming, or to reliability, or to correlations presumed to throw light on validity. Test norming on blind children presents nearly insurmountable problems, such as the availability of qualified test administrators and the availability of a representative population. I have detected no sensitivity to the fact that any given correlation coefficient can reflect any one of three psychological relationships between the two sets of data being correlated. Certainly, interpretations of correlational findings in terms of a mass-like perception of learning aptitude instead of a differentiated perception can lead to unwarranted confusion, as in a study comparing Raven and WISC results (Rich and Anderson, 1965).

Just how learning aptitude test results on blind children are used administratively is necessarily a function of the psychological sensitivity (as in contrast with the psychometric commitment) of the administrator, and in particular of his psychometrist or psychologist. This is a much more serious problem area in the case of residential schools where there tends to be a dearth of competently oriented psychological personnel.

It is in the instructional area where I believe we have our greatest concentration of sins of omission and of commission in using the results of testing the learning aptitude of the blind. (I assure you that this condition is not peculiar to teachers and supervisors working with blind children!) I shall identify only four matters in connection with the instructional facet of our larger problem. First, with much confidence, I make the observation that, just as in the public schools generally, the teachers and supervisors are not adequately trained regarding the merits and limitations of the results of learning aptitude testing, tending all too often to seek such results only on children who have become problem cases.

Second, these persons continue, as they have been taught, one way or another, to perceive the results of such testing in a mass-like manner and thereby fail to operate more effectively in terms of process and product--particularly with the young and the culturally disadvantaged children in whose cases process is much more meaningful than is product. Third, even assuming that educational personnel seek to adapt learning expectations, materials, and methods to the psychometric characterizations of their pupils, such perceptions and efforts tend to be geared to an IQ type of thinking than in terms of the levels of mental readiness of their pupils. At what level, for instance, might a blind child with a Hayes-Binet IQ of 75 be expected to work? By taking into consideration the fact

that he is 12 years old, the picture may be sharpened a bit, but even then he tends to be perceived only as considerably slower than other 12-year-olds. How often is his learning potential perceived in terms of its likely similarity to that of 9-year-olds? Fortunately, mental age characterizations are available for Binet results, whether they are used educationally or not.

I have worded these last statements in such a way as to lead into my fourth, and last, problem in the instructional area. This has to do with a need to state learning expectancies for blind children in terms of the results of good tests of learning aptitude. In the area of the sighted we can say, for instance, that if a child has a Binet mental age of four and a half years or so he has a pretty decent chance to profit reasonably adequately from the use of reading readiness materials, or that his chances of learning to read at a first grade level are reasonably good if he has a Binet mental age of about six years, or that he ought to have a Binet mental age of about ten years if he is reasonably to be expected to begin to learn division. However, we have no research of this sort on blind children. What mental levels (not IQ's) on the Hayes-Binet (or the anticipated Perkins-Binet) or comparable measure should blind children have to have a reasonable probability of learning the various kinds of things that blind children are expected to learn? The whole area suggested by this question is, so far as I know the psychoeducational literature on blind children, virgin research territory.

This leads quite obviously to my lament, which I mentioned in my introduction. In reviewing the literature relevant to my research, I became literally appalled at the commitment, industry, productivity--and unfortunately, the seeming fruitlessness--of Hayes' work in the psychoeducational area. Knowing the kinds of things he had tried to start, and knowing him somewhat personally, I can easily imagine that he would have got around to attacking the major research area to which I have just alluded. We need badly someone committed to programmatic research in what I here called the psychoeducational area of the blind.

It probably is true that we have now, on some kind of *pro rata* basis, more research on the blind and their problems than has been true in the past. But without detracting from that research or implying that it should be curtailed, I firmly believe that we must have more sound research in the psychoeducational area.

Summary

I have sought to suggest that a differentiated perception of the area of aptitude testing of blind children can be more fruitful, both educationally and psychologically, than has been the mass-like perception. While this mass-like perception definitely bore fruit, conditions now are such that we can get more meaningful information about these children if we begin to perceive both the testing task and the results of testing in the differentiated manner that is supported by research. The implications of this view have been only passingly alluded to regarding the training and qualifications of psychoeducational staff. We definitely need some sound research information on the appropriateness of educational expectations in relation to the results of learning aptitude testing of the blind.

REFERENCES

Cattell, Raymond B. "Theory of Fluid and Crystallized Intelligence," *Journal of Educational Psychology*, 54(1):1-22 (1965).

Guilford, J. P. *The Nature of Human Intelligence*. New York: McGraw-Hill, 1967.

Hecht, Patricia J., and Newland, T. Ernest. "Learning Potential and Learning Achievement of Educationally Blind Third-Eighth Graders in a Residential School," *The International Journal for the Education of the Blind*. December, 1965, pp. 1-6.

Horn, John L., and Cattell, Raymond B. "Age Differences in Fluid and Crystallized Intelligence," *Acta Psychologica*, 26:107-29 (1967).

Newland, T. Ernest. "The Blind Learning Aptitude Test," in *Report Proceedings of the Conference on Research Needs in Braille*. New York: American Foundation for the Blind, 1961, pp. 40-51.

Newland, T. Ernest. "Predictions and Evaluation of Academic Learning by Blind Children: I--Problems and Procedures in Prediction," *International Journal for the Education of the Blind*, 14:1-7 (1964).

Newland, T. Ernest. "Prediction and Evaluation of Academic Learning by Blind Children: II--Problems and Procedures in Evaluation," *International Journal for the Education of the Blind*, 14:42-51 (1964).

Rankin, Richard J. "The Ohwaki-Kohs Tactile Block Design Intelligence Test" (Rev.), *Journal of Educational Measurement*, 4(4):261-2 (Winter, 1967).

Rich, Charles C., and Anderson, Robert P. "A Tactual Form of the Progressive Matrices for Use with Blind Children," *Personnel and Guidance Journal*, 43(9):912-19 (1965).

Addendum

Generally, the efforts reported in Mr. Davis' paper reflect what I must regard as research naivete, an implied assumption that an intelligence test is an intelligence test is an intelligence test, and a primary commitment to psychometric tinkering rather than a seeking of psychological information. As Mr. Davis suggested, the droplets of information which have come from the testing of small, unrepresentative, and poorly defined populations must not be confused with a needed precipitation of knowledge. Generally, psychometric concern about IQ's seems to have dominated completely over sensitivity to educational need for even simple mental ages or test ages. Working to obtain normal distributions of IQ's is an appropriate first step, psychometrically, providing the populations are adequate and the assumptions regarding the characteristic being measured are sound and relevant. Ascertaining the correlations between tests can yield fruitful information only so long as the psychological constitutions of the variables being correlated are clearly understood. But those doing these kinds of things tend entirely too often to be insensitive to the needs of instructional personnel (teachers and supervisors) for more relevant kinds of information.

One relevance of the main point I sought to make in my paper to the overall impact of Mr. Davis' review seems apparent. All too often, it seems to me, there appears to be reflected in the activities relating to test development and adaptation perceptions that, even psychometrically considered, reflect the mass stage in perceiving learning aptitude testing. As I have indicated, an elementary differentiation that would be most helpful involves consideration of the test results in terms of mental age, or test age, as different from the conventional IQ orientation. More important, however, there should be differentiation regarding the natures of the behavior samplings that are made and also the kinds of behavior we presumably (at least implicitly), seek to predict.

There are problems in ascertaining the learning aptitude of blind children that make mandatory the recognition of differences between the behavior samplings of the blind and those of the sighted child. It is true that tests such as the

adaptation of the Kohs, the Raven, the WISC, and the Binet throw some light upon the learning aptitude of the blind. This is shown by the positive correlations between the various pairs of them. This information is of value because such intercorrelations enlighten us regarding a pervading substructure of "intelligence." But it must be recognized that different tests yield different kinds of helpful information. We need also to differentiate among them and then give serious consideration to the extent to which their behavior samplings do, and should, satisfy the underlying assumption of comparable acculturation. This is particularly true, for instance, of some of the items in the Comprehension subtest of WISC. Scores in this reflect self-sufficiency, but more appropriately for sighted children than for blind children, for whom some of them are grossly inappropriate. To discover that blind children do less well than sighted children on the WISC Comprehension subtest is to discover that the sun seems to come up in the east. All children, not just blind children, can and must be perceived discernibly different, as based on the total scores (usually IQ's) they earn on the WISC Verbal and their performances on the separate subtest scores on the WISC. The Information subtest, for instance, is essentially a measure in terms of product, while the Similarities subtest can throw much light upon process.

A more important differentiation is essential to our perceiving the behavior samplings of blind children, particularly if we are sensitive to the widely varying kinds and amounts of acculturation which characterize them, particularly those in residential schools. A large number of the behavior samplings involved in the Binet, WISC, and Williams involves what I have referred to as "product"--what the child *has* learned--although this is not as great a shortcoming as many imperceptive persons have claimed in the recent general social reaction against "intelligence" testing. The often-deviant acculturation of blind children makes it particularly incumbent upon all of us to give more concern to sampling those behaviors--those psychological processes--which can make, and have made, possible the learnings that dominate the samples that have been made. While the need to be concerned with "process" is not limited to those who work with blind children, it seems to me to be of especial importance in their cases in view of the wide diversity of nurturant backgrounds out of which they come. This concern with process if of particular importance with respect to young blind children; it lessens somewhat in importance as the child gets older, because increasingly product begets product.

We need to push on, developmentally, in our perception of the learning aptitude of blind children. Our information and theoretical orientations are sufficient to warrant such progress. We need to push on from an IQ orientation not to throw

it out. We need to push on in efforts to make the information obtained about learning aptitude usable in the classroom situation and not just in the psychometrist's office. We need to push on in recognizing that different tests yield different kinds of information, and that these different kinds of information reflect significantly different things in the learning aptitudes of blind children.

Assessment of the Nontestable Blind Child

Anna S. Elonen

The clinical psychologist is confronted with the problem of gauging adequately the potential intellectual endowment of children who are born blind, become blind soon after birth, or have a sufficient visual handicap to be classed as "legally blind." In spite of the fact that recent attention has been focussed on the deviant blind child, one continues to find too many blind children whose development demonstrates a marked lag. Many, of course, have been born prematurely, but unlike most sighted prematures, the developmental lag becomes more pronounced with time. In many instances the condition is further compounded by accrual of an overlay of emotional disturbance.

Both the atypical development of the child and a lack of adequate tests for the blind, particularly at preschool levels, complicates the problem of assessment. Those who first introduced test instruments for the blind assumed that approximately the same amount of stimulation towards mental growth and the same type of environmental influences were at work among the blind as among the sighted. Because of time limitations, only a sampling of the individual's total abilities can be included in any test. The verbal test type was chosen at the beginning chiefly because it is the easiest and most available form of existing test to convert for use with the visually handicapped. In case of well-rounded development in the normal child, this sampling gives a representative picture of the total developmental level. Individuals whose abilities are irregular, however, are apt to receive a nonrepresentative rating if their development happens to be particularly low in those areas stressed by the tests. Without question, the effort was to make the test items as similar to the test items of the seeing as possible without determining whether they would serve the nonseeing equally well.

Therefore, when the psychologist is asked to evaluate the potential of a poorly functioning blind child, clearly misleading and often detrimental conclusions may be arrived at because environmental factors, both physiological and psychological, which have contributed to the overall developmental picture have not been taken into consideration. The three most common conclusions are that the child is mentally retarded, he is brain damaged, or he is autistic.

It is not surprising that a common inference is that the child is hopelessly retarded and the best disposition is to have him committed as a retardate. The fact that the child's functioning is far below the level expected of a child of his

chronological age seduces one into acceptance of the obvious as the correct conclusion. Too many psychologists believe so unswervingly in numerical ratings that they brush aside any qualitative observations made which cast doubt on the quantitative result. The tendency, then, has been to accept ratings at face value and, therefore, to greatly underestimate the potential capacities which can be proven to exist by subsequent training and therapy. In assessing these children, it is important to establish whether or not they have had an opportunity to do those things expected of a child of his age, and whether or not after they have been adequately stimulated they still are unable to do such tasks. It is extremely important to remember that to get one of these children to begin functioning near his chronological age, after a period of stagnation, will take much more time and effort than had the readiness for the different developmental steps been recognized and fostered when the child was ready to perform in a manner similar to the normal sighted child.

Some of the children are diagnosed as brain damaged because of irregularities found in their performance profiles and their hyperactivity. Actually, the profile patterns found in the case of brain damaged and deviant blind children are very different. Typically, only a very few specific "soft spots" can be detected in the case of the brain damaged, for in most areas the overall functioning level is close to expectancy; with the deviant blind child his performance approaches his chronological level usually in only one or two respects. Unless the brain damaged are very grossly damaged indeed they have acquired the usual living skills and are deficient only in very specific learning skills usually involving the abstract or spacial areas. In the case of the blind it is interesting to note how frequently these peaks are identical from child to child. High achievement is most frequently observed in special areas such as musical ability (either singing or playing an instrument), or recalling sports information.

In contrast to the relatively good basic motor skills of nonspastic brain damaged children, deviant blind children often are unable to walk well or to use their hands dexterously. Actually a few are not able to walk at all, and too often their inert hands remind one of spaghetti. As far as can be determined, no physiological condition prevents them from being active. Speech may also be totally missing, or may appear as undifferentiated grunts or meaningless repetition of empty words or phrases. In many cases their speech is a feedback from advertisements on radio and TV commercials. In others it may be a parental admonition obviously related to a traumatic incident. When the material recalled is lengthy, one has evidence that the child has recall ability--sometimes excellent recall, at that. This, in turn, suggests that had he not been "babysat" by machines, but had been exposed to human contact

as much as to mechnical devices, he would be able to communicate at some higher level.

If the poorly functioning blind child has not been labeled as organic or retarded, then the chances are he will be diagnosed as autistic. Certainly a casual examination would suggest that their appearance is similar to that of autistic children. Significant differences, however, can be noted. These children never have been a part of their world, and hence, have not retreated like autistic children. Their blindness has only too effectively separated them from their environment; since they have not been actively forced to join the mainstream of activity about them, they have remained in a nonstimulated, self-preoccupied state. The difference becomes very clear when one attempts to begin therapy with them. In the case of the autistic child, there is definite resistance to being contacted, and it may actually take years before such contact can be established. In the pseudo-autistic blind, however, relationships can be established in a surprisingly short time, often in as short a period as six weeks.

Another label has been used with these deviant blind children: "idiot savant." The lone peaks of accomplishment sometimes described have been taken as evidence of an "idiot savant" phenomenon. Whether this was also true of the idiot savant cases in the literature or not, it can be readily established that among blind children a particular accomplishment begins by pure chance. The parents, so delighted to find that the child can actually do something, provide further motivation and opportunity to develop an incipient skill. An example of this can be seen in one boy who showed phenomenal recall for sport events, while most of his achievement in other areas was quite low. It became clear that the mother had never really been able to accept his blindness, and therefore had not been able to form a close relationship with him. The result was that the child's stimulation had been slighted. The father, perceiving this unconsciously, had tried to make up for neglect on the mother's part by spending more time with the child. Because of his own strong sports interests, and because his contact with the child was chiefly after work and on weekends, he combined his own pleasure and his duty to his son, and he exposed the boy to a disproportionate amount of sports events. When the boy responded eagerly to such contact and began to give indication of comprehending and enjoying it, the father naturally increased the amount of stimulation further still. The result is that the boy is an outstanding sports expert although his other achievements are mediocre.

The problem, then, facing the psychologist confronted with estimating the potential functioning level of the very young blind child (or older blind child whose development has not progressed normally), is not only to evaluate the psychological

test performance, but to recognize the import of the observations made of the child. What can be obtained by means of tests and observation should then be assessed in the light of information provided by medical findings and the social and developmental history. From all these records one can judge the extent to which family dynamics have helped or hindered the child to establish basic object relations and develop ego functions. The medical history should indicate to what extent physical complications multiply the problem. One is then in a better position to weigh the extent to which the stimulation the child has received (or has not received) may have influenced his current functioning level. Since existing tests so frequently are not suitable, and usual methods of administration may not be applicable, great resourcefulness will be demanded of the examiner. It is obvious that he will have to devise different methods on the spur of the moment, and predict intuitively from the few indices available whether any potential exists for a greater development than that seen on the surface.

A few deviations from more formal test administration have proven to be useful. If a child is completely unable to carry out a given task, one can test whether he has never been exposed to anything of the kind, or he simply has not been able to benefit although he has received proper stimulation. One shows him, slowly, how to do a task, then continues with testing and observations. At the end of the testing, that is, after a fairly long interval of time, the trained task is reintroduced. If the child is now able to succeed, it suggests that had he been more adequately stimulated his functioning level might be higher. If the child demonstrates he can learn, the parents can be given numerous suggestions about how they might stimulate the child to make up for the lag in developmental skills, lack of incidental learning, and consequently low motivation characteristic of such blind children.

It is well to have the parents return at regular intervals to determine how well the child's performance is improving. The age of the child and the level of the observed functioning will determine whether they should return frequently or infrequently. The interval should not be longer than six months, because should the parents not have understood the guidelines suggested, or not have been able to carry through for any reason, too long a period of time will not have lapsed, the stagnant state will not have become fixed, and a significant period for training will not have been lost. An interesting correlate to this is that as the child begins to show improvement, the parents' hopes are changed. This changed hopeful attitude, in turn, is picked up by the child, and as a result the child's improvement rate is increased.

The irregularity of the performance profile should also be studied for indications of the specifity of the training.

As mentioned above, one often finds that some of these children are functioning at or close to their chronological level only in one or two very specific areas. One then must determine whether the child has been motivated and stimulated only in these particular areas. A child who has demonstrated an ability to learn in one area can often do as well in other areas if he is given the opportunity.

In the course of testing and observation it is well to establish to what extent the child comprehends language. Many parents are very positive that the child does not understand anything said to him. In fact, there have been several instances in which medical staff have stated, without questioning their conclusion in the least, that the child was also profoundly deaf. In these instances it has been very revealing to the parents when a child who has been requested by the examiner to do a simple task has been able to follow through and do it, however tentatively. Until that moment they had assumed the child had not understood anything said to him or in his presence. It is well that "doubting Thomases" witness such a demonstration, because many refuse to believe an examiner's unsupported word. In one case, it had been suggested to a so-called "expert" that a potential for responding existed despite the fact that the child's general development was very slow. The expert merely reiterated that a child of six who could not do such and such had to be retarded, and profoundly so. Yet, this same child, who had very good mobility, showed definite puzzlement because the snow drifts over which he had crunched the previous week had disappeared. He would get his bearings from a familiar spot, and begin anew many times, sure that he had gone astray because the crusty snow failed to materialize at the spot at which he expected to find it.

Other blind children, as contrary as their sighted counterparts, give evidence of understanding directions by doing exactly the opposite of what is requested of them. Clearly, this is not a question of comprehension, but rather of their wish not to conform when they consistently reverse each command.

Another child, whose speech at best could be described as of the "word salad" variety, and whose motor skills, outside of walking, were almost nonexistent, was seen by the examiner after an interval of several years. The child was asked if he remembered her. Since the meeting was accidental there could be no question of the child's having heard or being coached concerning the identity of the examiner. To her amazement the child broke his usual pattern and answered by giving her name.

These tiny little deviations are in such direct contrast to the generally low developmental level of the child that they make the examiner question whether the obvious conclusion might not be incorrect after all. Having established one little point as a basis, he is then in a position to explore further the actual potential of the child.

A case history can possibly best illustrate what happens in the case of a blind child who is potentially capable of advancing normally, but has failed to do so because of inadequate stimulation. At the age of one year a little girl was referred by the ophthalmology and social service departments to me for psychological tests. The mother had been so completely bewildered by the problems presented by the blind child that, although she had given exemplary physical care, the child's development did not approximate that of the average child of one year. In the course of testing, the child gave some hint of being able to do more than demonstrated by the test results. To explore this possibility, she was painstakingly shown how to do a few tasks. In general, her behavior indicated that her understanding of the task was completely different from that of the typically defective child and, therefore, in spite of the fact that the obtained rating fell within the defective range, the examiner decided that the numerical result was completely irrelevant. As a result, suggestions were made by the psychologist to the mother of ways in which she might be able to give proper stimulation to the child and encourage her to do things for herself. Because it was difficult for the mother to change her method of handling the child immediately, a social worker began intensive counsel with the mother. The mother was able to overcome her overprotective feeling to the extent that when the child was three years old, the numerical ratings had reached the average range. This child continued to make further progress, and by the time she graduated from high school she was the valedictorian of her class.

Because of the paucity of experienced examiners of the blind, and the importance of not mislabeling a blind child demonstrating a developmental lag, longer observation periods in a variety of situations by members of different disciplines have been experimented with. Longer periods permit the observation of children singly or in groups, in formal and informal situations, and while stimulated or relaxed. Because these children, like all children, respond better to certain people than to others, the response to different personnel in various situations should be compared. For example, the sex of the individual may improve or impair the possibility of responding appropriately.

Long periods of observation, by members of different disciplines, each with his particular bias, permit pooled observations before making a final recommendation. This allows for a sounder recommendation than when one individual, in a brief--and for the child, a strange--situation, is expected to make a quick diagnosis.

It is, therefore, fortunate that more institutes which plan to use a multidisciplinary approach are beginning to emerge. A clinical center can provide the ideal situation, for it permits

diagnostic evaluation and consultation among the various disciplines, and as complete an evaluation of the individual as possible without subjecting the child to the stress and strain of referral to many diagnostic sites. And the parents are not completely confused, as they often are when contradictory diagnoses are made in different centers.

In a multidisciplinary center, two-way mirrors can be used to demonstrate behavior under question, both to parents and staff. Being told what can be done with a child is less accurate and less convincing to one than actually seeing it done. Such demonstration can also help in avoiding distortion, for what is seen is often less subject to misinterpretation and is recalled more correctly than that which is heard. It must be remembered that it is not only the blind child who is disturbed; the child's visual problems have caused a tremendous emotional impact on his parents.

In conclusion, adequate assessment needs not only the skills of one individual, trained in a particular field, but the cooperation of many with breadth of knowledge, awareness, and point of view to pick up significant and subtle elements from the general picture, and to avoid being mislead by surface manifestations. Apparently, even in the case of the sighted, ". . . to look is not always to see."

Discussant: Bluma B. Weiner

Dr. Elonen has expressed her position with great economy, clarity, and precision. There were several points of unusual interest to me. She observed the excessive and unduly persistent developmental lag in so many of the children whom she has seen; she commented upon the poverty of the formal instruments available for assessment of preschool children and infants; and she was emphatic about the neglect by examiners of environmental factors which may contribute largely to developmental lag. She also gave us several examples of astute clinical diagnoses of children whose behavior was quite baffling. Dr. Elonen spoke of *erroneous* conclusions of mental retardation, brain damage, and autism in children with various symptoms in conjunction with severe visual loss, but a problem of great concern to me is this: suppose, after very careful observation and diagnostic evaluation, you come to a *correct* conclusion of retardation, brain damage, or autism? I am sure Dr. Elonen feels that evaluation should not stop short for such children. Someone has to live with them; someone has to relate to them; someone has to try to socialize them; someone has to try to teach them. The brevity of most so-called diagnostic evaluation sessions has troubled Dr. Elonen deeply, and the whole thesis of her

presentation may be summed up in the sentence "Observe, and keep observing." We need to give careful thought to different kinds of situational observations, especially for the young and so-called "untestable" children, to arrive at even tentatively useful judgments about them and recommendations for them. We need to learn more about each child's responses in real-life situations, such as in handling toys and other objects; feeding; dressing; toilet; relating to familiar and unfamiliar adults, children, and animals; responses to male and to female persons; and to new experiences of many kinds. Such observations are not considered extreme or out-of-bounds by responsible investigators of child development; they have been standard procedures in experimental nursery schools for 50 years or more. Clearly a most important implication for the examiner of young children with any serious disability is the need to acquire skill in making such observations, and in fitting them into some kind of plan on which parents, teachers, and others can build their unique services. I have tried to formulate a scheme for such observations, and so far have come up with something that I call a "Tinker Toy." It isn't ready yet to be dignified by the term "model," but it does seem to have some value for directing and organizing observations along certain dimensions of educability, namely *level, rate, range, efficiency,* and *autonomy.* These dimensions have been described in the March, 1967 *New Outlook for the Blind*, and I shall not dwell on them here, except to interpret them briefly for the sake of illustrating my point. We need to observe our children with respect to *how much* of and *how complex* a performance they can achieve; this is what I call *level*. We need to ascertain how long it has taken to acquire such achievement *in toto*, or in terms of specific increments; this I call *rate*. We need to know the variety--that is, *range*, of achievements, and to encourage participation in a wider spectrum of activity. And we need to know how accurate (*efficiency*) are the achievements and how self-initiating and directing (*autonomy*) children are in specific undertakings. This kind of pattern for observation can be adapted to all ages and circumstances. I am especially concerned that the child whom we call untestable should have the benefit of this approach to evaluation. It seems to me that Dr. Elonen would agree.

Brain Waves and Blindness

Jerome Cohen

A series of research studies have been completed on the electroencephalographic (EEG) characteristics of blind children and adults in relation to various tests of psychological functioning and medical assessment. The EEG findings will be reported in considerable detail to establish clinical standards for EEG interpretation in cases of visual handicaps, and also from the viewpoint of theoretical interest. Of special interest are the findings on children with retrolental fibroplasia (RLF) compared with data from sighted premature controls, which to my knowledge has not been studied before.

We have reported in the past on the EEG investigation of 28 blind children with the diagnosis of RLF. The present study reports findings on 42 cases of RLF, of whom 20 have had repeated EEG's, from two to four years after the initial examinations. Fifteen children of comparable age, with blindness due to other causes, and 24 adults have also been studied electrographically. Because of the marked abnormalities in the tracings of the group of children with RLF, we chose 32 matched sighted premature controls as a comparison group for the RLF's, with the hope that the results would clarify what findings are peculiar to blindness and what findings may have been produced by the conditions surrounding the premature births. The question of possible brain damage beyond the visual system in cases of RLF has remained open. The findings with RLF which are similar to the previous report will be reviewed, and the broader group data and the control data will be presented for comparison.

The Subjects

The 42 children with RLF are from the group that has been known as the Greater Chicago Project on Blind Children, which was begun as a study project at the Eye Clinic of Chicago University in 1952 and terminated at Northwestern University in about 1963 (1, 2, 3). This was an intensive, longitudinal, interdisciplinary project aimed at defining the psychological, physical, and sociological characteristics of young blind children, the majority with RLF. Additional children, blind from other causes, were obtained through medical and educational centers concerned with blind people. Young adult blind were primarily obtained through the cooperation of the Illinois Visually Handicapped Institute. Sighted full-term children were obtained for comparison with the blind on many tests, but it was not deemed necessary to do standard clinical EEG's on a normal group. Control records would just be redundant to the

usual standards of interpretation of children's records, which are well-known in practice. Control groups were measured on some of the psychological tests which are beyond the scope of this paper to report.

We do feel that there is no adequate psychological control for blindness, since it has such major consequences for all aspects of human development; this makes a strictly experimental approach difficult. However, testing children who are not visually handicapped, but who underwent comparable conditions of birth and intellectual development as the RLF's, provides valuable control data. Comparatively little is known about the EEG's of early premature children, especially those who were given oxygen while still in incubators. Children were identified from the birth records of the premature unit of a Chicago hospital and retrospectively traced and found. We were able to get 32 cases to undergo the EEG and other tests to provide a sufficiently large control group, matched on the criteria of sex, age, degree of prematurity, birth weight, and fairly comparable in duration of incubation and oxygenation. We selected two possible matches for each blind subject, then selected the paired control on the basis of the one closest in intelligence and socioeconomic factors to the blind subject as the matched control individual for all the other tests.

Characteristic Features of the EEG

Berger discovered the rhythmical changes in voltages recorded from the human head (4, 5), which was termed the *alpha* rhythm, thus becoming the first in the Greek letter designations of electrical brain activity. It is strictly defined as rhythmical activity of 8 to 12 cps. which is blocked by eye opening, and it is enhanced when the eyes are closed. It generally has a larger voltage in the back part of the head, usually maximal over the occipital lobes. In practice, slower activity that behaves in other respects like the alpha rhythm, and is the predominant rhythm of the resting brain, especially in younger children, is considered a slow variant of the developing alpha rhythm, which tends to get faster until about 10 years of age.

Alpha rhythm is the usual background rhythm and often is the most characteristic feature of normal resting brain activity. If it is blocked or desynchronized by eye opening, arousal, or alertness it tends to be replaced by low voltage faster activity, in the 13 to 25 cps frequency range, called the *beta* rhythm. If beta rhythms are fairly synchronous in large areas of cortical tissue underlying the recording electrode, the activity appears at the surface; otherwise, when it is nonsynchronous, the recording appears fairly flat with some irregular low voltage fast activity. Loss of the alpha rhythm in a normal person usually represents visual attention, mental effort, or

emotional arousal, in which cases the alpha rhythm is replaced by low voltage fast activity. The alpha rhythm also disappears during drowsiness or loss of alertness below an average level, in which case the cortical activity is minimized and the record goes a bit flat with irregular low voltage slow waves appearing. In sleep the activity of the brain is driven by lower centers and higher voltage slower activity is seen, often rhythmical, at about 5 or 6 cps in young children, and less regular in older people.

The various stages of sleep and the EEG indications of the depth of sleep have been described by Dement (6). Most commonly observed is an appearance in the drowsy and falling-asleep stage of *theta* rhythms of medium voltage, with a frequency of 4 to 7 cps. In the deeper stages of sleep, slower rhythms of 1 to 3 cps, defined as *delta* rhythm and often of high voltage, appear. Also in the lighter stages of sleep unique electrical features are seen, called sleep humps and sigma spindles. These have characteristic distributions with maximal voltage in the central-parietal and the frontal areas. They are often best displayed in electrodes in a bipolar pattern across the top of the head from ear to ear. If sleep was induced by barbiturates or some other sedatives, beta activity is apparent in the frontal areas as fast spindles. A period of sleep accompanying rapid eye movements (the REM stage) has been identified with dreaming (7), and there is often a reappearance of alpha rhythm for long periods during that time in sleep (paradoxical alpha), possibly representing the cortical arousal activity during dreaming.

Abnormalities in the EEG

The above are the expected EEG features in normal recordings. Abnormalities which concern us in making diagnoses may be generalized over the whole brain, restricted to one hemisphere, or localized to restricted areas on one or both sides of the head. Usually all of the abovementioned activity is fairly symmetrical between the two brain hemispheres, and variations of voltage or frequency beyond certain limits are considered abnormal. Departures from the expected frequencies of brain activity, usually slowing, are common abnormalities. Certain wave forms such as spikes, sharp waves, spike-dome complexes, or rhythmical activity under certain conditions are other abnormal diagnostic features.

Very few abnormal features represent specific pathological conditions, but they represent something unusual in electrical activity which is presumed to have some relationship to the underlying metabolic processes or organic damage in the neuronal structure. One must keep in mind that although the EEG is an objective physiological measure (voltage differences over time), the recordings are subjectively interpreted, involving as much art as science. Abnormal features may represent functional as

well as organic disturbances--if that distinction has validity. That is, a similar feature at the scalp may represent a structural lesion or damage or a temporary functional event which cannot be interpreted in isolation.

There was no reason at the outset to anticipate the rather startling findings which have come out of the study. Both Adrian (8) and Drever (9) noted that in a few of the blind people they had tested there was a decrease in alpha rhythm. Several other authors who reported EEG's on blind subjects made no particular mention of the alpha rhythm, but emphasized the frequent abnormal recordings from cases of RLF. There was at first no reason to suspect generalized brain effects from RLF, and those most concerned with social and psychological welfare in the field of blindness tended to overlook the possible presence of other organic effects of RLF, though many educators, physicians, and parents were convinced that more was involved than destruction of the retina and optic nerve.

The Alpha Rhythm and Mu Rhythm

We were surprised to find that people who became blind soon after birth displayed almost no alpha rhythm, rather than an exaggerated alpha rhythm (as in sighted individuals with eyes closed). Of course, we use a broader definition of alpha rhythm with the blind, since blocking with eye opening is not a criterion. With the absence of alpha rhythm, three major types of records emerge: one that is of rather low voltage with a majority of fast components; one that is dysrhythmic in appearance, containing mixed waves of frequencies varying across the range, but very little of a rhythmical nature; and the slow record, composed of activity, mostly in the delta and theta range usually of higher amplitude. With such records, eye opening, or visual stimulation even in cases of light perception, produce no change. The occipital lobes are no longer the origin of the background rhythms of the EEG, as is common among sighted subjects.

Among one third of the blind individuals we found a bilateral alpha-like rhythm in the central brain regions with very little spread anteriorly, or posteriorly to the back of the head. This at first caused us to see some alpha rhythm in the blind when using the average of all the electrodes as the reference lead, so we now prefer bipolar and monopolar recording using the ipsilateral ears as the reference. After our first publication on EEG in cases of RLF (10), I learned about the *rhythme en arceau* discovered by Gastaut (11), and determined that we were actually seeing a high percentage of cases with just such a rhythm, now known as the "wicket" rhythm or *mu* rhythm, because of its characteristic shape (see Fig. 1).

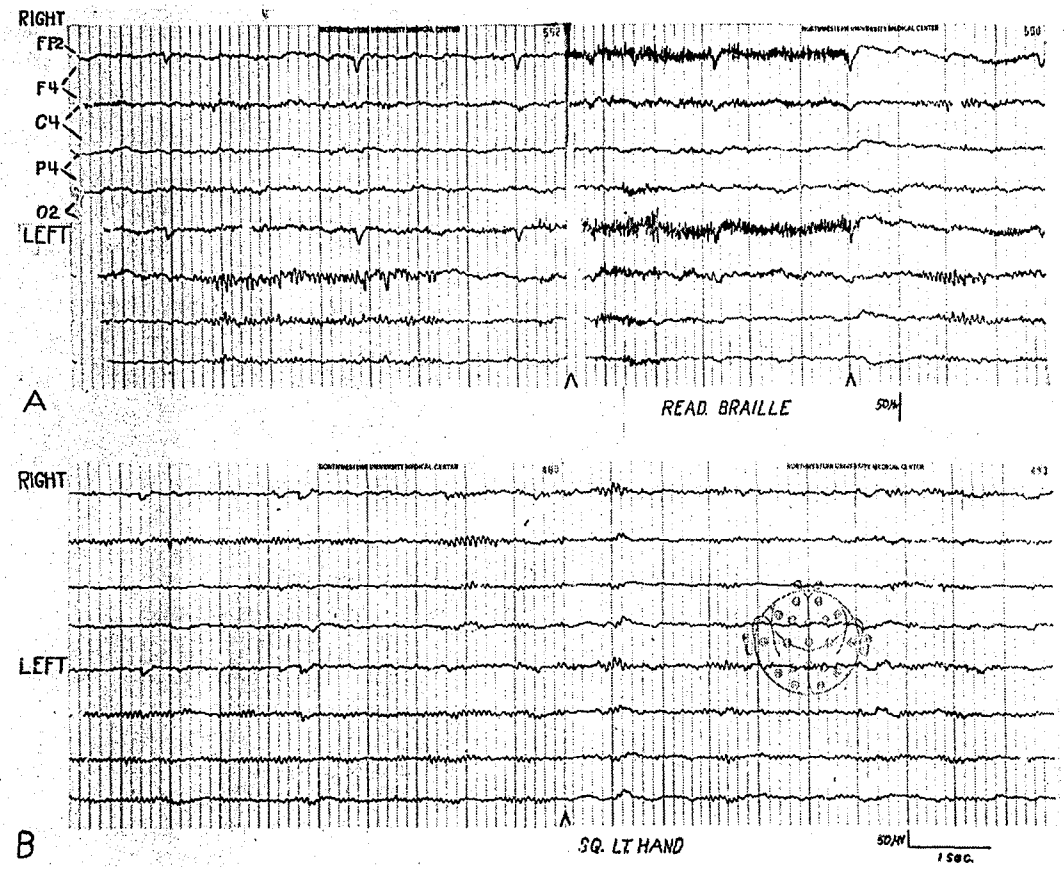

Figure 1.

(The Mu rhythm in the blind is illustrated by these following figures, showing the effects of hand movement.)

Figure A is from the record of a 13-year-old girl, Figure B from that of a 15-year-old boy, both blind from near the time of birth with retrolental fibroplasia. The derivations are bipolar with electrodes placed in the 10 to 20 international system. All channels are as indicated in the upper left of the figure, representing parasagittal runs, usually optimum for Mu rhythm. The left half of Figure A shows an asymmetrical Mu rhythm of about 10 cps on the left side and a virtual absence of alpha rhythm. The Mu rhythm is completely suppressed in that portion of the record taken while the person is reading braille with her right hand. The Mu rhythm is restored after reading stops.

Figure B shows a well-developed symmetrical Mu rhythm which is rather more widespread; it blocks during rhythmical squeezing of the left hand, more on the contralateral side.

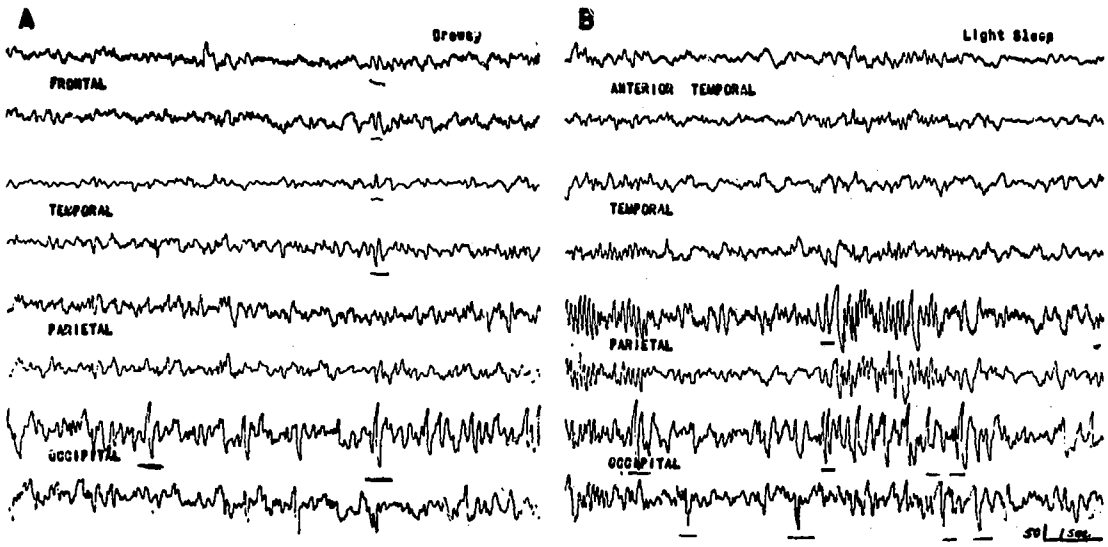

Figure 2.

This record illustrates the presence of occipital spikes and sharp waves in the waking (A) and sleep (B) records of a 9-year-old blind child. Monopolar recordings to the ipsilateral ear lobes as reference are shown. The first line of a pair is the left side and the second line is the right side. B also shows the presence of normal sleep humps and spindles in a totally blind child. The severity of the abnormality is rated as 3 due to its frequency, but it is mainly confined to the biocipital areas.

The frequency distribution of mu rhythm is very similar to alpha rhythm. It may occur independently of alpha rhythm in individuals who display both rhythms, and it has a characteristic distribution around the central or Rolandic fissure. As the alpha rhythm blocks with light stimuli, the mu rhythm blocks with tactile stimuli and movement. The mu rhythm is a rare normal rhythm, which is seen in not more than 3 percent of sighted people, whereas the alpha rhythm which is seen in over 95 percent of sighted people is seen almost not at all in people blind from birth. Bilateral mu rhythm, although rare, is normal since it does not signify any brain disorder. As with other EEG phenomena, extreme asymmetry is taken as a pathological sign, but we can tolerate some asymmetry in mu rhythm in the blind without postulating an organic lesion (12).

The presence of mu rhythm does not correlate with any other measurable characteristic of blind individuals, just as it does not seem to correlate with any other electrical, physiological, or personality characteristics of sighted people (although Gastaut claims it to be somewhat related to suppressed aggressivity in normal personalities). There seems to be a parallel relationship between the neural visual mechanism and alpha rhythm, and the neural tactile-kinaesthetic mechanisms and the mu rhythm, which will be elaborated in a further theoretical discussion.

Abnormalities in the EEG of RLF's

Fairly long records were taken using both monopolar and bipolar combinations of electrodes in the international 10 to 20 positions, while awake, while asleep if possible, and using hyperventilation, and often repetitive photic flashes, as activating procedures in cases where there was any ability to see the flashes (and even in some of the totally blind as controls). Some mental imagery procedures were also used which may be discussed at another time. Overall ratings of the records were made independently by two raters, with good agreement, on a four-point scale: "1" is normal, "2" is mildly abnormal, "3" is decidedly abnormal, and "4" is extremely abnormal. Criteria were established for such a clinical evaluation without including reference to the alpha rhythm, which by itself would make the whole set of records appear abnormal even without any specific abnormalities. Since almost all normal individuals have normal records, the theoretical average of normals would be just slightly over 1.

The average rating of the premature sighted control subjects is 2, with 18 of the cases getting a rating of "2" (mildly abnormal), and 7 cases each with a normal (1+) and a 3 rating. The average rating of 42 children with RLF is 3.06, which means the typical RLF record is definitely abnormal. The 29 children with light perception had an average rating of 2.69. Each of

the RLF group differed from the premature control group at the 1 percent level of confidence, and the difference between the light perception only and totally blind group was not statistically significant.

The most common abnormality in both the premature blind and sighted children is excessive slow activity in the records, present in just over three-quarters of the blind and under three-quarters of the control cases, a difference which is not significant. Only 7 of the premature and 8 of the RLF records were without excessive slow activity. The 8 blind records were of the low voltage/fast type, as were 2 of the controls. Out of the 34 RLF records with too much slow activity, 24 were bilaterally symmetrical, 7 were right-sided, and 3 had left-sided asymmetrical activity. Nine of the control records were bilaterally asymmetrical, with 8 of the 25 cases of slow waves being maximal on the right and only 1 on the left side.

The second most common abnormality is the presence of sharp waves and spikes. Here there was a great difference between the premature RLF and control groups. Twenty-nine children with RLF had sharp wave abnormalities, with 24 showing definite medium to high voltage spikes, and only 13 were without sharp waves (see Fig. 2). Nineteen out of the 32 premature controls were without sharp waves, 6 had low voltage spikes or sharp waves, and 7 had medium to high voltage spikes. Also in the control group the abnormality was predominately in the right hemisphere, with 8 cases right to 1 case of spikes on the left side. In the blind group, 12 were mostly on the right side, and 6 cases were maximal on the left; in 11 cases the spikes were equally distributed on either side.

In the blind group, the abnormalities are more frequent on the right side, by a ratio of 2:1, but in the premature controls, the abnormalities dominate the right hemisphere by 8:1. A significant difference (at the 1 percent level of confidence) in the transient abnormalities between the blind and sighted prematures is in the amount of sharp and spike waves present, and not in the amount of slow activity. It is surprising that the records of the premature controls are so abnormal, which again calls to mind the possible general harmful effects of oxygenation. As we did not run a group which did not receive excess oxygen, we don't know what amount of abnormalities is expected, but the impression is that light weight prematures do not have such a high incidence of abnormal records.

Location of EEG Abnormalities

The blind children with RLF and the premature controls show differences in the location of abnormalities. In both groups, the occipital lobes exceed by far the other brain areas in location of abnormal discharges, which include both spikes

and sharp and slow waves. About one-fourth of each group have generalized abnormalities, and only a few of the sighted prematures have additional abnormalities beyond the occipital region. The blind group, however, have a high incidence of abnormalities in the parietal areas and the occipital areas, with only 6 cases of abnormalities confined to the frontal and temporal regions. The two groups differ significantly only in reference to the incidence of abnormalities affecting the parietal area alone, or in addition to the occipital regions.

There were very few abnormalities other than spikes, sharp or slow waves in either group, and no special wave forms were recognized as seen only or typically in the blind groups of subjects. By and large, neither the blind groups nor the premature control subjects had significant unilateral decreases in voltage; and aside from the abnormalities already mentioned the traces from both hemispheres tend to be symmetrical.

Interpretations

Among the premature controls, 6 records would be compatible with a diagnosis of an epileptic disorder, but only 1 subject had seizures. Two of the 6 had a speech defect and asthma, and none of the others had any major physical disabilities. None of the prematures showed generalized spikes in the records in all brain areas, but 5 of the blind cases did show generalized spikes. Fourteen blind children out of 42 had some clinical evidence of seizure disorder, and 11 of those had EEG records with electrical evidence of seizure-related discharges; 3 cases with seizures did not show seizure activity, but that is not unusual in clinical experience. The unusual finding is that 23 records from the blind group, or about half, were compatible with a seizure disorder affecting the brain. Almost all of the seizure-type activity occurred in the occipital and in the parietal areas, when not generalized over the whole surface of the scalp in the blind children. The temporal lobes were only rarely involved, though they are the most common epileptic focus in sighted people with seizure disorders.

Reexaminations and Maturation

Twenty of the children were retested from two to four years after the initial examination, to see what effects increasing maturity has on the brain records. During the changes from approximately 5 to 12 years of age, we expect to see some maturational changes in the records, such as an increase in the average frequency of background rhythm from about 6 to 10 cps to 8 to 12 cps, and a corresponding decrease in the slower rhythms, and some improvement in the stability of the records. The later records were compared to the earlier records against

the background of ordinary changes expected with age. Fourteen out of the 20 retest records remained about the same. One record showed a worsening, in that what had been irregular slow activity in the first record persisted, and also runs of high-voltage paroxysmal slow activity appeared in the second record. The slow waves decreased more than expected due to age, so this represents a true improvement in 3 cases. The spikes disappeared in 2 cases and were much improved in 2 cases; so there was significant improvement in 7 cases, a worsening in 1, and 12 remained about the same. The alpha, mu, or background rhythm became better organized or faster in 6 cases and remained either absent or about the same in 14 of the 20 cases. In no cases did the background rhythm slow or become less well-organized.

The overall change with increasing age is an improvement in the records, but they do not become normal. The slow waves and spikes tend to decrease in frequency of occurrence and to reduce in amplitude. The abnormalities tend to become less generalized and to concentrate in the occipital regions, where there is less improvement with age. The basic background frequencies tend to increase, but in their absence, the records take on a flat, low voltage appearance if higher amplitude slowing does not occur.

Background Activity

The data relating to the alpha rhythm is not yet complete, and many more individual records from people with accurate medical histories should be taken. But it would be well, at least in this paper, to present some tentative conclusions. Occipital alpha rhythm is absent in cases of total blindness or light perception dating from birth. Alpha rhythm tends to be present in cases with object perception, or a visual acuity in the better eye of about 5/200; with an acuity of better than 10/200, the alpha rhythm is nearly normal in distribution over the head, but the amount of alpha rhythm in a record is less than in fully sighted people. It tends to be less rhythmical and is lower than in the average sighted person. Partially sighted individuals usually have no impairment of alpha activity.

After blindness occurs in an adult, the alpha rhythm seems to slow gradually and be reduced in amount and also in amplitude. After about a five-to-ten-year duration of blindness, the alpha rhythm is virtually gone in totally blind people who claim to no longer use visualization in dreams or waking life. Alpha rhythm tends to remain in people who continue to visualize and then the alpha blocks with active imagery. The research in this area is difficult because imagination is such a subjective process, but this is the impression of the experimenter. If blindness is not complete, but object perception is residual, then the alpha rhythm is unimpaired.

If blindness occurs after 3 or 4 years of age, the alpha rhythm tends to be present in the records until about 10 years of age, but it seems to disappear faster than in blind adults. The frequency may even increase after blindness occurs, but it will tend to be slower than normal for the age. Not surprisingly, the alpha tends to be bilaterally symmetrical and there is no relationship to the laterality of the visual loss. Slow waves or spikes do not appear in children who became blind from peripheral causes after the first year of life, if other areas of development are normal. Although visual evoked responses are present to light flashes in children with light perception only, the alpha rhythm cannot be induced or driven unless there is enough vision for it to be spontaneously present.

EEG and Peripheral Blindness

Some comparison should be made between the brain records of people blind from RLF, other central nervous system causes, and peripheral blindness such as cataracts or accidents, but here the situation is not so clear-cut. Often the cause of blindness which appears to affect only the optic nerve or eye may also have some central nervous system effects. This seems to be often true of RLF, which can no longer be considered only a disease of the receptor organ, although the retina is the primary target tissue.

The typical record for strictly peripherally blind adults is a low voltage, fast record with only traces of alpha rhythm in the occipital regions, with some mu rhythm (in the central brain regions) in about one-third of the cases. No spikes and no excessive slow activity are expected. The sleep rhythms or delta waves, sleep humps, and spindles are present as in the sighted population. There is nothing unusual in the tracings during sleep, and the amplitude of the slow activity and spindles are the same as in sighted people. Abnormalities in the records beyond the absence of alpha rhythm and a greater tolerance of asymmetry for the mu rhythm may be interpreted in much the same way as in the sighted population. Slowing restricted to the occipital areas has only minor significance. Central nervous system blindness which affects brain functions other than vision will often be reflected in abnormal EEG records, as is often the case in RLF's (13, 14, 15).

The situation is not so clear-cut with children's records up to the age of about twelve years. Young blind children without other apparent nervous system damage are apt to exhibit generous amounts of slow activity, maximally in the occipital lobes, but it may be generalized as well. Occipital spikes are also frequent, and often spread to the parietal regions, especially in children with light perception. The spikes and slow waves improve from two to about ten years of age.

Persistent spike and dome complexes and high amplitude, repetitive (2 to 4 per second) spikes which become generalized, and high amplitude, paroxysmal (2 to 3 per second) slow waves are more likely to reflect a syndrome of brain impairment, especially in children older than about six years of age. Different standards must be applied to the interpretation of blind and sighted childrens' records.

Summary and Conclusions

Electroencephalograph records, medical data, and psychological data were obtained from a group of children ranging in age from about 4 to 14 years who were completely or partially blinded from retrolental fibroplasia and several other causes. Control studies were also run on premature sighted children and blind or partially sighted adults who lost their vision at various ages from both central and peripheral causes.

The standards for the interpretation of EEG's of blind people must be different from sighted people, especially in young children and those blinded from RLF. The EEG is a useful adjunct to other medical and clinical investigations, and further studies of evoked potentials in response to sensory inputs should provide better evidence about how well the individual is adjusting to his impairment. A clinical EEG record may not be judged abnormal in reference to the alpha rhythm, and its presence in cases of blindness of long duration may lead to the inference that the individual has maintained active visual imagination. Much of the occipital slow activity in young blind children is seen also in similar patterns in the light birth weight premature children who have no visual disability. We don't know whether that fact relates to oxygenation or not, and the activity seems to be of little consequence unless it is of high voltage and paroxysmal--that is, synchronous and repetitive at 2 to 3 per second. It then seems related to an organic brain impairment, and is usually related to a seizure disorder, cerebral palsy, or a generalized learning disorder in blind children. Small scattered spikes tend to be expected in the records of young blind and partially sighted children, especially with RLF. They are most prevalent among RLF children with light perception. The occipital spikes seem to be the irritative response of neural tissue which has endured stress and is being bombarded by neural transmission which the brain is incapable of organizing. There is cause for speculation, but the important result is that a child not be labeled as an epileptic or brain damaged child solely on the basis of an "abnormal" EEG record, that is, abnormal by comparison with norms established from sighted subjects.

Records from children blind from causes other than RLF tend to have less slow activity, to be dysrhythmic, and are often rather flat. Adult blind persons who have not retained

visual imagery lack an alpha rhythm after up to ten years of blindness, and they tend to have a low voltage fast record. Rhythmical activity in the alpha frequency range is maximal in the central brain areas; it has been identified as mu rhythm, related to the senses of touch and kinesis and to movement and motor imagery. As with prolonged artificial visual deprivation, the alpha rhythm slows, and is present to a lesser extent in long-blinded individuals. Sleep activity is unchanged from the records of normal, sighted individuals. The EEG records must be interpreted with caution, and only in consideration of the findings of a full medical and psychological study.

REFERENCES

1. Norris, Miriam, Spaulding, Patricia J., and Brodie, Fern H. *Blindness in Children.* Chicago: University of Chicago Press, 1957.

2. Boshes, L. D., Cohen, J., Alfano, J. E., and Lee, Wan-Ho C. "Longitudinal Appraisal of School-Age Children with Retrolental Fibroplasia," *Diseases of the Nervous System,* 28:221-30 (1967).

3. Cohen, J. "The Effects of Blindness on Children's Development," *Children,* 13:23-7 (1966).

4. Berger, H. "Uber das Elektrenkephalogramm des Menschen," *Arch. F. Psychiat.,* 87:527-70 (1929).

5. Brazier, Mary A. B. *A History of the Electrical Activity of the Brain.* New York: Macmillan, 1961, pp. 110-16.

6. Dement, W., and Kleitman, N. "Cyclic Variations in EEG During Sleep and Their Relation to Eye Movements," *EEG and Clinical Neurophysiology,* 9:673-90 (1957).

7. Dement, W., and Kleitman, N. "The Relation of Eye Movements During Sleep to Dream Activity: An Objective Method for the Study of Dreaming," *Journal of Experimental Psychology,* 1957, pp. 339-46.

8. Adrian, E. D., and Matthew, B. H. C. "The Berger Rhythm: Potential Changes from the Occipital Lobes in Man," *Brain,* 57:355-83 (1934).

9. Drever, J. "Some Observations on the Occipital Alpha Rhythm," *Quarterly Journal of Experimental Psychology*, 7:91-7 (1955).

10. Cohen, J., Boshes, L. D., and Snider, R. S. "Electroencephalographic Changes Following Retrolental Fibroplasia," *EEG and Clinical Neurophysiology*, 13:914-22 (1961).

11. Gastaut, H., and Bert, J. "EEG Changes During Cinematographic Presentation," *EEG and Clinical Neurophysiology*, 6:433 (1954).

12. Cohen, J., Cobb, W., and Dunkley, Gill. "The EEG in Conditions of Somaesthetic Constancy," *Revue Neurologique* (Paris), 1964, pp. 332-35.

13. Kellaway, P., Bloxsom, A., and MacGregor, M. "Occipital Spike Foci Associated with Retrolental Fibroplasia and Other Forms of Retinal Loss in Children," *EEG and Clinical Neurophysiology*, 7:469-70 (1955).

14. Gibbs, E. L., Fois, A., and Gibbs, F. A. "The Electroencephalogram in Retrolental Fibroplasia," *New England Journal of Medicine*, 253:1102-06 (1955).

15. Cohen, J. "Electroencephalographic Findings in Blindness Due to Retrolental Fibroplasia," *Proceedings of the First International Congress on Technology and Blindness*, New York: American Foundation for the Blind, 1963.

Comments: Gabrielle C. Lairy

We recently surveyed 222 EEG records from 126 children, all congenitally blind or partially sighted, taking into consideration both the waking background activity and the occipital spikes with relation to age, amount of residual sight, mental level, and other psychological and behavioral conditions. These records were also compared to those of a control group of sighted children matched for age.

The age of the subjects ranged from 1 to 18 years; the younger group of under 5 years were considered separately, since very young children's EEG's, even in a sighted population, raise peculiar problems. The other records were considered year by year, except for the older subjects (over 13 years), who were considered as one group.

The visual condition was evaluated in most cases with the best possible accuracy. Incomplete data were naturally often

obtained in the youngest population except from some obvious cases of total blindness. Four groups could be isolated, however: total blindness or light perception; vision less than to 1/10; between 1/10 to 2/10; above 2/10. These acuities measured the residual vision of the best eye with the best possible correction. The population was too heterogeneous to allow correlations with the etiology of the visual defect (glaucoma, cataracts, congenital diseases of retina, errors of refraction, and so forth). Children with gross cerebral organic damage or epilepsy were excluded from this study, which was mainly devoted to peripheral visual defects.

Psychological evaluations were done for most of the investigations. It is well-known that accurate measurements of mental level are often difficult and scoring questionable. Nevertheless, the EEG's were arranged into 3 groups according to the score obtained at the time of the recording: low mental level (IQ less than 75); mediocre (75 to 90); normal (above 90). Other psychological investigations have been done to test motricity, psychomotricity, and cognitive functions.

Background Activity

We agree completely with J. Cohen's findings concerning alpha activity: a well-synchronized alpha rhythm, restricted to or dominant in the occipital leads, was quite exceptional in our population. More generally, either alpha rhythms were completely absent or a very complex activity was recorded, consisting of a mixture of alpha, theta, and/or rapid frequencies with usually low amplitude.

Flat records were found mostly in total blindness with no relation with age. Slow background activity was not related to age, but to the amount of visual defect (total blindness and residual sight less than 1/10) and to low mental level (IQ less than 75). The existence of a good or fairly regular alpha rhythm, found in 20 percent of the records, was neither related to age nor to IQ, but largely to the amount of residual sight (vision above 1/10). A clear spatial organization of the waking resting EEG is a common feature in a sighted population, the occipital activity being differentiated from that of the more anterior regions by a better synchronization and a higher amplitude; this was not the case in our population of visually deprived, where 80 percent of the records showed no or very poor spatial differentiation; that is to say, the frontal, rolandic, parietal, temporal, and occipital leads appeared to give about the same activity with about the same amplitude, or even a higher amplitude in the central leads. This fact was not related to age, but once more to the severity of the visual impairment; the absence of any blocking reaction to eye opening showed the same relationship.

Typical central mu rhythms were found in 40 percent of the records; they appeared at all ages (over 5 years), but in greater proportion in two age groups: around 9, and over 13, years. Mu rhythms did not appear to be related to the amount of residual sight, but were most often found in the normal IQ group (IQ above 90).

We can thus conclude that, except for mu rhythms, there were no relationships between age and the variables which define the waking background activity. This suggests that the maturation of the electrical activity of the visually deprived brain follows a quite different pattern from that of sighted children. We suggest that the differences in the organization of the waking EEG of visually deprived children may be in some way related to their functional disturbances in general motricity and psychomotricity.

Occipital Spikes

Occipital spikes were found in 46 percent of the records, whatever the etiology. They never occurred under 3 years of age, were rather rare under 5 years, the greater proportion (61 percent) being encountered around 9 years. Their proportion was equal to 53 percent in the three subgroups with no or little vision, falling to 38 percent in mental level. If one takes into consideration the topography of these occipital spikes (right, left, or bilateral), proportions and correlations appeared different: right occipital spike foci were found in only 10 percent of the records, more frequently in young children under 9 years 6 months old, and particularly in those with a poor vision (1/10). Left occipital spike foci were found twice as frequently. In young children they were always at least as frequent as right foci, but their proportion predominated in children over 10 years of age. Considering the amount of visual impairment, it must be stressed that left occipital spike foci never occurred in totally blind children, but were observed especially in children with a residual sight intermediate between 1 and 2/10. Bilateral occipital spikes, most often asynchronous on the two sides, were found in 16 percent of the records. They were the most frequent in totally blind children.

The psychological and clinical profile of children with right, left, or bilateral occipital spikes showed marked differences, which seemed important in a prognostic appreciation of the cases. Broadly speaking, most of the children who showed left occipital spike foci were school-aged, partially sighted children, with good intelligence, who could use their residual sight as the main channel for education, even when it was very poor; they appeared to be intellectually motivated children with rather good emotional and affective adaptation, but great perceptual/motor difficulties as a consequence of the visual defect.

The children who had right occipital spike foci showed quite the opposite picture; they were often younger children, with complete blindness, or poor residual sight with no motivation to use it. They tended to have either a low mental level or at least poor efficiency and important difficulties in space orientation and body image. The bi-occipital spike foci appeared to be a property of the most disturbed children on both visual and psychological levels: these children showed impairment in perceptual motor tasks and in space orientation and body image, with a very heterogeneous development of intellectual and cognitive functions and sometimes a picture of psychosis. The low IQ score in these cases was often quite unreliable, reflecting this maturational dysharmony which often appeared to be a consequence of an inadequate early education more than of the blindness itself.

The follow-up of these cases showed, first of all, that none of the children with occipital spikes subsequently had epilepsy, even though no anticonvulsant medication was prescribed. The EEG evolution showed the possibility of disappearance with age of the spike foci, especially when they were left-sided. This disappearance was sometimes parallel to an improvement in behavior and school adaptation.

Our opinion is that these occipital spikes do not reflect any systematic organic brain damage, nor do they account for epileptogenic disturbances. They may express a functional disturbance of the associative cortical areas of the immature brain which is also responsible for the clinical cognitive dysfunctions.

In view of this, it is important to warn those who use EEG in the evaluation of blind or partially sighted children not to interpret these records with the same criteria as they would use for sighted children. Differences in EEG's of blind and sighted are not sufficient evidence to allow in the former case a diagnosis of chronic brain damage or epilepsy. As we have pointed out, the process of electrical maturation of the brain in cases of congenital visual defect follows an evolution of its own. The occurrence of occipital spikes may be one more element of this peculiar maturation when functional behavioral problems reach a certain importance. To make an epileptic of a child who is only visually handicapped can be a great mistake, just as it is to "treat the record" instead of the child. For instance, giving drugs on the basis of EEG features alone will lead to even greater difficulties in education, rather than helping the training and adaptation.

In conclusion, it seems important to stress that we should not interpret the EEG of the blind with reference to that of sighted children. Their development is "different," but must not be judged automatically as "abnormal." The development merits a systematic genetic study.

Editor's Note

During subsequent discussion at the conference, a study of prematures was cited in which the highest correlation of the ratings of EEG's (at 6 years) on a normal-to-abnormal continuum was found to be with a parental attitudes scale. Parental attitudes as determinants of the experiences provided to the children are apparently objectively measured by this scale (the Parental Attitudes Research Instrument, developed by Bell and Schaefer at the National Institutes of Health Child Development Center).

Administration of anticonvulsants entails the additional risk of producing an epileptic fit by a sudden withdrawal of the drug. Such a fit would be an antifact, not to be regarded as confirmation of a diagnosis of epilepsy.

Discussant: Arthur H. Parmelee, Jr.

I am going to attempt to focus your attention on what I think are the main points of these two participants. First of all, I want to say that what they tell us is common knowledge among a small number of people; but the large majority of electroencephalographers, I am afraid, still do not recognize that the EEG of the blind child has abnormalities that are not related to the abnormalities of the sighted child. Often these records are called "severely abnormal" when, I think, at least these workers would regard them as not at all unusual for a blind child. I'll try to present what I think are the theoretically interesting aspects of this problem. I am also going to venture presenting some elementary neurophysiology, and some recent experiments that might illustrate how EEG changes in blind children might come about. I will also comment on what I think these studies suggest for the future.

First, I will discuss alpha-rhythm. This was the first rhythm described in the EEG, and has always excited people because of its relation to vision. It is present in sighted people when they close their eyes, but are still awake. It also appears when the eyes are open, when attention wanders. The fact that this rhythm is not present when there is no visual input is very interesting. Then the fact that Dr. Cohen has found alpha-like rhythm in the parietal area of the brain more commonly in blind than in sighted people is also interesting, because in this area it could be related to tactile stimuli. One can speculate about a shift in orientation of brain function with a similar rhythm to a new area of the brain. This, then, is interesting from the standpoint of a shift in normal organization of the brain from one area to another when *sensory modality is missing.*

Second, there is the problem of spikes in the *occipital* area. At first these were described only in cases of retrolental fibroplasia, and it was thought the spikes may be due to prematurity or oxygen poisoning; but now, occipital spikes have been reported in all forms of congenital blindness. To some extent the frequency of occipital spikes has a quantitative relationship to the degree of blindness. Maybe Dr. Lairy would not quite agree, but there are some reports of this nature. This means to me that with different degrees of loss of sensory input into the occipital cortex, different kinds of disruptions occur in the visual area. The fact that small premature infants, even those not blind, have more occipital spikes later than other children, as noted by Dr. Dreyfus of Paris, is of special interest to us, because it may mean that these small prematures are getting some kind of visual overload, too, early in life. These are exciting speculations. This is the way we would like to look at EEG data--not as evidence of some unknown organic damage. I think there is as yet no evidence that oxygen causes damage to the brain. We keep looking for damage, and theoretically it might be so, but so far we have no evidence. Another interesting aspect of the work of Dr. Lairy and Dr. Cohen is that with maturation the EEG changes of these children ameliorate. Whatever functional reorganization there is going on in the brain seems to be accomplished by adolescence.

Now, with your indulgence, I will attempt a brief neurophysiological explanation. To understand the limitations of an EEG, one must remember that we are measuring on the skin, and on the outside of the skull. Beneath our electrodes, in the brain, are some rather large cells which we call pyramidal cells. There are many other types of cells, but these may be the most important. Whatever we are measuring seems to come from this layer of cells in the cortex. We may regard these cells as similar to a dipole battery that is positive inward and negative towards the surface of the cortex; when a stimulus comes in, the cell is depolarized and the negative-positive relation of the dipole shifts. The EEG recorder is essentially a galvanometer, and thus we are measuring the current as it shifts direction. The stimulus that depolarizes the cell, or several cells in unison, may be coming from below, from the specific and nonspecific areas of the thalamus, or other areas of the brain.

The areas of the cortex are called occipital, temporal, parietal and frontal. The two we have talked about most are the occipital and parietal. Visual information from the eye goes through a thalamic nucleus called the lateral geniculate, and from there to the occipital cortex, but part of the signal that goes through the lower part of the lateral geniculate will go to the brain stem, particularly the superior colliculus, and then to other areas of the cortex.

The physiologists Hubel and Weisel at Harvard did some very interesting studies. They have been mapping out the cells of occipital cortex that responded to stimulation, by actually putting their electrodes into individual cells to record their firing when the eye is stimulated. They studied kittens, occluding one eye from birth to two months of age. Then they recorded the activity of the cells of the occipital cortex. They already knew that stimuli go from one eye to both sides of the cortex, but predominantly to one side more than the other for certain cells. When they occluded one of the kitten's eyes, they got quite a disruption of firing in cortical cells on the side that that eye tended to dominate. This they expected. However, in their next experiment, they occluded both eyes, and got far less disruption of firing on either side of the cortex. This indicated that the lack of sensory input itself was not so destructive as the imbalance of the input. They then looked at the cells of the lateral geniculate and occipital cortex microscopically to see what kind of damage, if any, was present. The lateral geniculate cells get almost direct stimulation from the eye. There they found quite a bit of reduction in cell size and growth, but not so much change in the cells of the occipital cortex.

In another study, Globus deprived kittens of visual input and did microscopic analyses of sensory dendritic terminals. He found that only small segments of the dendrites were lacking synaptic terminals, and that other areas of the same dendrites had normal numbers of synaptic terminals. These findings indicate that blinded kittens still have much nonvisual input to occipital cortical cells. In another study, Sprague and Galambos have removed the occipital cortex and found that the kittens still made visual discriminations, which means that visual input is also going to other areas of the brain. While the occipital cortex is the most important visual area it is not exclusive, and visual input goes diffusely to many cortical areas, with interconnections between the different parts of the cortex.

We come back, then, to the fact that Dr. Cohen finds more mu rhythm or an alpha-like rhythm in the parietal cortex in blind than in sighted children. This suggests a function reorganization of the brain, with time, in blind children, which is consistent with the findings of Dr. Lairy. What I would like to point out is that these findings are important in our efforts to understand the brain. We should not yet try to interpret EEG findings in blind children in terms of malfunction.

There is one other point that is critical in this and in other studies of the blind. As far as I am concerned, there is seldom, if ever, pure peripheral blindness. For example, there are 20 or more causes of cataracts, such as galactosemia or rubella. Galactosemia is a metabolic disorder that also

causes many other bodily disturbances. Rubella infection, during pregnancy, causes cataracts in the baby, but also encephalitis, congenital heart disease, and other physical problems. There are some chromasomal defects with cataracts, so that to say the blindness was due to cataracts is not enough. Retinoblastoma presents one with the problem that these children have vision for a while, and then have their eyes removed, so they are not the same as infants who have been blind from birth. They are quite different when their eyes are removed in infancy. Optic atrophy is a catch-all for many things. Each case of optic atrophy can have a different cause. The term simply implies that the receptor's transmission from the eye is not functioning as it normally should. Then, of course, we can have retinal degeneration from rubella, retinitis pigmentosa, and retrolental fibroplasia. It is pretty difficult for us to say that there is any pure peripheral lesion causing congenital blindness, although some may behave functionally as simple peripheral blindness. There are some interesting neurophysiological studies we can do of blindness in children to determine where the block of the visual input is; one can do a retinogram to see if there is any electrical activity in the retina, and this would indicate that at least some parts of the retina are functioning, and we can judge about how much. We can put a light flash in the eye and see if we can record an evoked response from the occipital area, or even elsewhere in the brain. This tells us whether transmission to the cortex is present or not. We can study the functioning of the geniculate ganglion in a blind child by studying the rapid eye movement (REM) phase of sleep. These studies are in progress. In addition, Dr. Lairy is doing some of the most interesting work in computer analysis of EEG's.

I wish to bring out that while there is a negative aspect to this discussion, since we feel we should not diagnose organic disease from the EEG in blind children, there are also many exciting things from the standpoint of possible ultimate understanding of the neurophysiology of the brain in blind and sighted children.

Evaluation of the Minimal Brain Damage Syndrome in Blind Children

Jack Arbit

The evaluation of effects attributable to various conditions which interfere with the integrated and organized functioning of the brain has been of concern to psychologists for a considerable time. Not only have psychological tests proved worthwhile in determining the intellectual status, scholastic achievement, and personality variables which might be influenced by conditions affecting the intact and organized functioning of the brain, but the differential diagnosis of the presence or absence of an organic involvement and data regarding its status (chronic or acute), locus (focalized or generalized), and type (a growing or static process) are frequently obtainable through the use of psychological tests.

With their focus upon cognitive functioning, memory skills, and concept formation abilities it is little wonder that standard intellectual tests have proved of value in the ascertaining of the presence of an organic brain dysfunction sufficient to disturb higher problem solving, goal-directed processes. With the inclusion of tasks which are relatively nonverbal, tasks with a greater emphasis upon perceptual and psychomotor skills, we are provided with yet another sample of behavior that is often sensitive to disturbances predicated upon a neurological dysfunction. In tests of personality, in the behavioral attributes of which we would expect a "final common pathway," there may be found evidence of any meaningful disturbance of the integrity of the brain as a causative factor, or as producing a deficit to which the individual must adjust psychologically.

Although psychological tests are frequently employed in the evaluation of conditions often listed under the rubric of "organic brain damage," or "organic brain disturbances," or "organic brain involvement," or "organic brain impairment," these terms are extremely crude in discussing the precise features to which psychological tests are sensitive. Psychological tests sensitive to dysfunctions or functional impairments at a neurological level are of a different order than are other measures of brain organization, the electroencephalogram, pneumoencephalogram, angiogram, and brain scan. Psychological tests measure a behavioral variable which can be influenced not only by disturbances at the neurological level, but by motivational factors both intrinsic to the patient and in the interaction between the examiner and the patient, by the presence of nonorganic disturbances in psychological functioning, and by impairments in any of the sensory input modalities or the expressive modes of responding. It is often with considerable

difficulty that psychological test performance varying from "normal" is assigned to poor intellectual capability, significant psychological disturbances with attendant thought process disorders, meaningful alterations in the integrity of brain functioning due to a neurological disorder, or any set of these variables taken one, two, or three at a time with, even then, the question of relative import of factors unsolved.

The degree of neurological damage which may be present in a youngster varies over a wide range. There are those children with marked neurological defects: cerebral palsy, mongolism, and hydrocephalus are but a few of the gross disorders which produce profound effects. The severest neurological abnormalities will likely be diagnosed on the basis of neurological and attendant laboratory studies, including EEG. In these cases psychological tests provide an evaluation of the status of various cognitive, conative, and symbolic processing functions. Yet the integrity of the neurological substrate is not a unitary, "yes-no" phenomenon. The degree of neurological damage or dysfunctioning may vary from such gross disorders as those mentioned to those which are so mild that they shade imperceptibly into the normal range. These more moderate degrees of neurological involvement may result from structural damage or disturbed integration of the various aspects of brain functioning as it processes information through the sensory input system, the storage, correlative, and analytic functions, to the motor outputs. These deficits have been considered as essentially defining the minimal brain damage syndrome, sometimes called a "perceptual handicap," minimal brain dysfunction, and more recently in a gross categorization as "the dysfunctioning child." Considering the sensory loss in blind children we would seem to be most reasonable in referring to this minimal neurological disturbance as a minimal brain damage syndrome.

For the moment let us discuss this syndrome in the non-blind youngster. The large majority of these children appear normal at birth, and during their early years seem not to be significantly different from their peers. They may be more active than other youngsters, sometimes a bit clumsier, often become irritable, petulant, or have tantrums with only mild provocation. They generally pass the developmental milestones of sitting, standing, walking, and toilet training within the range of what is considered "normal." Through the preschool years there is little to differentiate these children from the wide range of what might be considered as normal--they may be different, but so is each child individually different in the abilities, functions, and behavior which are demonstrated.

Upon entering school an entirely new set of demands and expectations is placed upon the child. Although he may have had some nursery school experience or some informal teaching from parents or older children, the school makes certain formal demands which must be met and which in their intensity might be

considered as quite distinct from those to which the child had previously been exposed. The child must manifest sufficient control over his impulses and immediate needs so that he can sit quietly, attend, and absorb the material which is presented. In addition, he must begin dealing with formal learning programs: reading, with its concomitant demands upon the visual and auditory input systems; spelling, with its ordering of lines and curves in a spatial dimension and visual-motor coordination; and arithmetic, with its emphasis upon conceptualization of abstract constructs. It is precisely in the areas of impulse control, in the integration of visual and auditory input material in terms of storage and recall, in the spatial and temporal orientation of images, in the control of motor outputs by feedback from visual and auditory cues, and in the evolution of concepts that children with a minimal brain damage syndrome are handicapped. Not all are equally impaired, not all have an involvement of each function, but aside from individual differences one can see a pattern emerging which may be considered a meaningful clinical entity. In the classroom we may observe shortened attention span, hyperactivity, perceptual-motor disturbances, emotional overreactivity, and specific learning problems even when the child is of average or above average intellectual ability.

With this in mind let us reexamine the preschool behavior more closely. We noted that these children were often hyperactive. This would seem to result from an inability to temper the ready translation of psychological impulses into motor impulses due to poor intercommunication between areas of the brain that serve to modify and control the direct expression of the motor impulse.

These children are often more "sensitive" and irritable, or likely to be easily provoked into tantrums, for they must deal with one factor which does not confront other children. Their perception of the physical and the psychological world is different from that of other children and different from the objective reality. The representation of the world as carried by their sense organs and formulated within the brain is distorted and "muddied" by the disturbances in dealing with the "pictures" and "information" which their brains receive. It is not surprising to note that there is a high incidence of psychological difficulties and emotional disturbances reported in these children who must invest great energy to simply maintain control, and who may be having difficulties because their perception of people and events is different from what others perceive as reality.

Only recently have we begun to consider the underlying neurological dysfunction as an important factor in the diagnosis and treatment of the behavioral and learning disturbances with which these youngsters present, and to utilize the full range of neurological evaluative procedures and psychoneurological techniques in working with these youngsters. Without

a remedial program many of these children become underachievers, the school dropouts, the "acting-out" adolescents, and the adult "failures."

Most of our work with these youngsters has been remedial in nature. The prevention of the disturbance seems generally to have been left to improving prenatal maternal care, developing delivery techniques which inflict less trauma upon the infant, and making available to all children the newest in preventive pediatrics. There is no question that all these improvements have had some effect in reducing the incidence of the minimal brain damage syndrome. Yet there remain a large number of children who manifest this disorder to some degree. It is anomalous that those very techniques representing improvements in prenatal, birth, and pediatric care insure the continued presence of children with this syndrome. A greater number of children now live to school age who previously would not have survived precisely because of improved medical care. Many of these children have manifestations of some degree of brain injury.

To undertake preventive programs with children who are predisposed to develop the behavioral and learning disorder patterns associated with the minimal brain damage syndrome, it is necessary to diagnose the condition early. Waiting until it is fully manifest in the school age child precludes preventive efforts.

Anyone having spent even a modest amount of time with blind children will recognize that many of the behavioral features which we described as characteristic of the child with a minimal brain damage syndrome are also characteristic of the blind youngster. We cannot conclude, however, that blind children who are hyperactive, show dissociations between the input and expressive functions, or have difficulty in concept formation are necessarily showing the minimal brain damage syndrome; neither can one conclude that they are not. In blind children the behavioral manifestations may be due to a quite different causative factor and their presence does not aid in differential diagnosis. One would consider that their absence would allow us to rule out the presence of a minimal brain damage syndrome. Considerable research is necessary to understand the minimal brain damage syndrome in sighted and in blind children, and the remainder of this paper is directed toward describing our efforts in this area.

Because the incidence of the minimal brain damage syndrome is so low in the "normal" population of births, longitudinal research efforts with a random sample of infants, subsequently discarding those who do not show this disorder, is a costly and prohibitive endeavor. We have, therefore, concentrated our studies on a group of children who develop this disorder to a significantly greater extent than is observed in the normal population of childbirths: the child born prematurely.

At the same time, our studies of blind children have proceeded, particularly in terms of evolving objective test measures useful in evaluating the presence and influence of a minimal brain damage syndrome. One should not conclude from our emphasis upon premature children that only these youngsters show this disturbance: research strategy obliged our use of this "high incidence" group. Full term children, though to a lesser extent, may show this dysfunction. Though there is no incidence data, it is the author's impression that prenatal and birth conditions leading to blindness also increase the likelihood that there will be some minimal neurologic effects, and that those trauma that may result in blindness in young or school-age children also produce some transient or long lasting minimal neurologic effects.

For those who are familiar with psychological tests it is painfully apparent that many of these tests have a predominant visual component and are quite inapplicable to blind youngsters. Even in tasks directly usable with blind children, there are often no norms for the blind group. In addition, there is little study of effects that might be attributable to an organic brain impairment, as opposed to functional psychological disturbances or motivational factors, or an inappropriate interpretation of the interpersonal relationship with the examiner. In the congenitally blind youngster we must question whether it is tenable to assume that even the words have the same meaning as they might with sighted youngsters or children whose blindness occurred after language was established. For example, the occurrence of some concretization in the thought processes is occasionally observed as an indication of the presence of an organic brain dysfunction. It may also be a type of functioning which in blind children is a natural mode of handling verbal symbols and it is not infrequently observed in autistic youngsters.

In attempting to utilize psychological tests sensitive to the presence of an organic brain impairment, psychologists have frequently tended to "lump" rather diverse and heterogeneous groups within their experimental population. One sees tests standardized on brain damaged groups ranging in age from their early teens to approaching what is now euphemistically referred to as "The Golden Age," and characterized by conditions ranging from epilepsy, through unilateral surgery for a brain tumor, to congenital neurological diseases and tertiary luetic processes. A few tests have been developed to ascertain the intact functioning of specific areas of the brain, criterion groups occasionally having disturbances not only in similar areas, but disturbances due to similar causes.

I will mention only in passing, since this paper is concerned with children, that the effects of organic brain damage differ considerably, depending upon the age of onset. These effects are particularly different in terms of the manner in

which the individual learns to compensate for the deficit. This is of particular import, since in the use of psychological tests in evaluating organic brain damage we are using only the behavioral or, more precisely, goal-directed behavior as the "final common path" for the conglomeration of determinants--ranging from the basic integrity of the neurologic substrate, including the input and expressive neurologic pathways, the motivational features as only one aspect of the all-important personality attributes (structural and dynamic), and intellectual attributes.

In our study of children with retrolental fibroplasia, we needed to evaluate the intellectual, personality, and behavioral characteristics which might be influenced by the presence of a meaningful organic brain involvement. This became apparent since we used as a control group sighted prematures. The incidence in our study, and in previous reports, is of significant deficits attributable to the condition of prematurity in sighted youngsters. Reevaluating some of the early observations in this group led us to consider that the brain disturbance was neurological, and more akin to the hyperactive, impulse disorder of the brain damaged youngster with the psychological controls being unable to deal with this additional predisposing organic quality, than to a purely psychological behavioral disturbance predicated upon the psychological and developmental lacks associated with blindness, *per se*.

A review of studies dealing with psychological tests developed for the study of brain damage in late childhood indicated that they all either required a relatively intact visual input system, or dealt with constructs and concepts which in a population of congenitally blind youngsters might have a distinctly different covert meaning or symbolization. We required a task that would be suitable for blind children, a task which involved a minimal amount of conceptualization and concept formation, a task that could be handled by children with an intellectual level as low as the Borderline Mental Defective level, and lastly, some evidence that the task would be sensitive to the wide range of organic processes that might be found in a group of RLF youngsters. The inability to perceive illusions has often been noted in studies of brain damaged individuals, and much has been presented about the theory of brain function and the failure to perceive illusions. We adapted two illusions for presentation in the tactual modality.

Figure 1 shows one of the tasks which was employed. On one-tenth-inch aluminum sheets (9 inches by 27 inches) a one-fifth-inch square strip was attached. On one board, (A), the raised strip is straight and 24 inches long; on another, (B), the apex of the arc is five-eighths of an inch from a hypothetical straight line connecting the two end points; on another, (C), the apex of the arc is one and five-eighths inches from the horizontal; and on the last, (D), the apex of the arc is three and three-eighths inches from the hypothetical straight

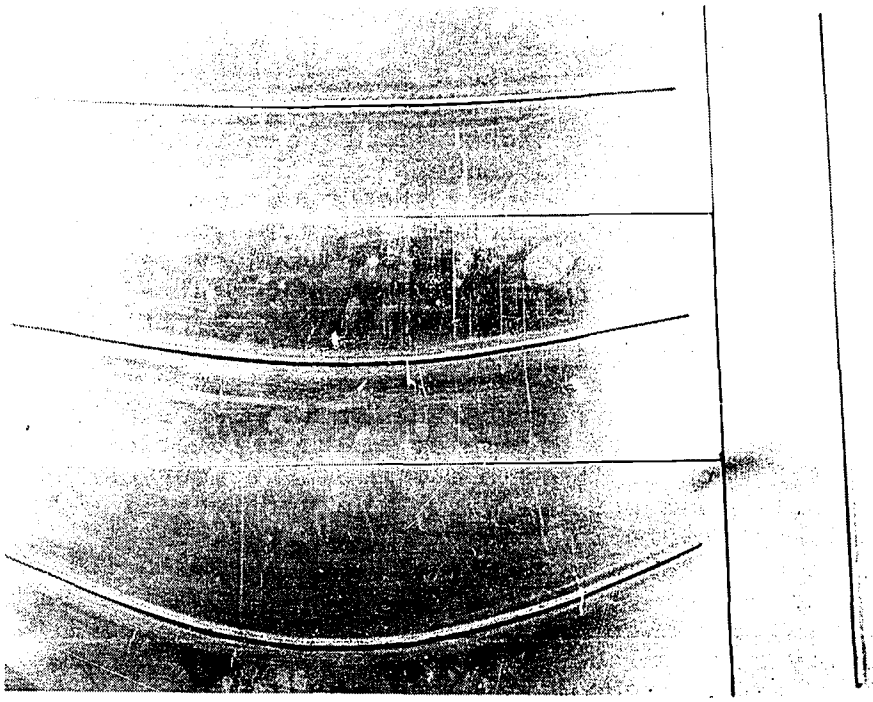

Figure 1

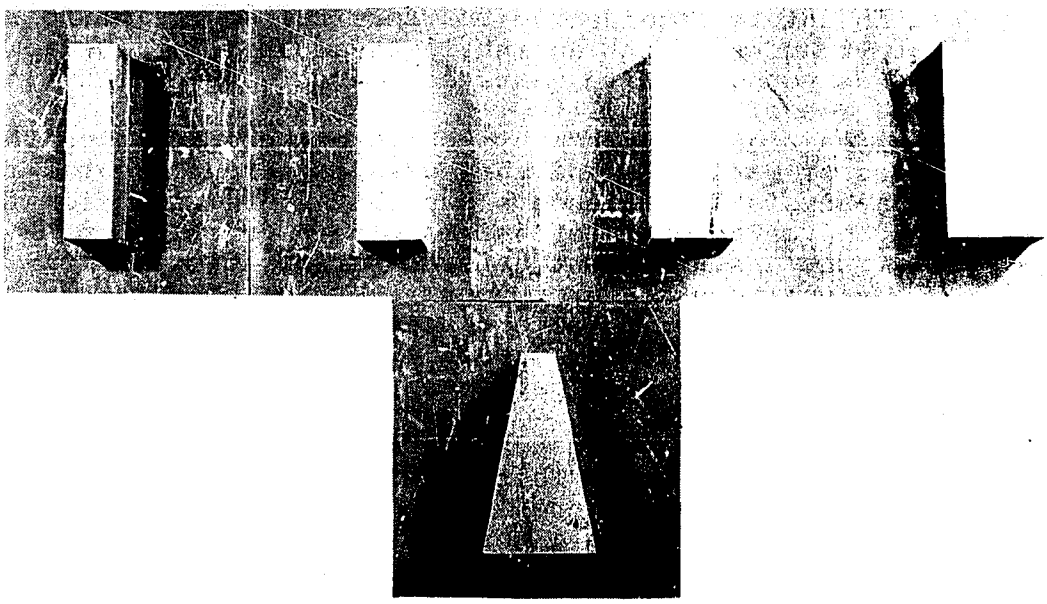

Figure 2

line connecting the two end points. Depending upon the manner of presentation the lines would be curving away from the subject or toward the subject. The task was rather straightforward. Using the individual's preferred hand, he was asked to move his hand from left to right, if he were right-handed, and right to left if left-handed, once along the straight line and then back to the starting point. The youngster was asked whether the line felt straight or curved: sighted youngsters wore blacked-out goggles. Subsequently, the youngsters ran a thumb and forefinger along the bowed curves, or the straight line, followed immediately by a reexamination of the straight line. The question was whether it felt straight or curved, and if curved, whether toward or away from the subject. This is a classical satiation study; the straight line should be perceived as curved in the opposite direction as the satiation stimulus. Ten trials with each of the six curves (three curves bowed in two directions) and ten trials with the straight line on the satiation stimulus were randomly administered.

The following table presents the results with 105 children who were referred for psychological testing from the Child Psychiatry Clinic, Northwestern University Medical School Clinics, Chicago Wesley Memorial Hospital, or directly to the author, by their pediatricians, school personnel, or school social workers. None of these youngsters had positive findings upon neurological examination or electroencephalographic study. These children were referred for a wide host of problems though they were obviously behavioral and psychological, school achievement, and intellectual in nature considering the referral sources. It is apparent that youngsters with an intellectual ability (IQ) as low as 75 and as young as five years can perceive the illusion with a high degree of reliability.

Ninety-seven sighted, premature children were administered the same series of materials and this data is also presented in Table 1. An analysis of variance shows that there is a significant effect upon the accuracy of judgment as a function of chronological age, a significant effect attributable to birth weight, and a significant interactive effect in which increasing birth weight serves to enhance the effects of chronological age. This same pattern of scores was found in terms of EEG results and other psychological test measures of organicity in this same population.

Electroencephalograms were administered to 46 of these sighted premature youngsters. These EEG's were rated on a scale ranging from 0 to 4 in terms of degree of severity of abnormality (with 0 indicating a normal record), and the presence of abnormality being either focalized or diffuse. A Chi-square analysis was obtained using 5 EEG rating groups, and the population divided into 3 groups of equal size on the basis of their performance on the perception of straightness task. The Chi-square is significant ($p < .04$), indicating that the

Table 1

Percent of Trials in Which Illusion Is Perceived

	Group 1				Group 2				Group 3			
Curve	A*	B	C	D	A*	B	C	D	A*	B	C	D
IQ:												
75-85	20	45	68	78	35	35	40	58	32	48	50	60
85-115	15	40	75	88	30	42	78	88	50	50	45	75
115-125	15	50	82	88	10	50	75	75	48	37	78	70
Sex:												
Male	15	42	72	78	20	48	58	78	38	52	55	85
Female	16	48	72	88	25	42	60	68	48	45	57	68
Age:												
5-7	30	32	55	75	40	40	60	55	-	-	-	-
7-9	20	40	68	80	25	28	72	70	-	-	-	-
9-11	15	40	65	88	25	48	52	80	45	58	58	75
11-13	15	48	68	95	10	68	80	78	40	42	60	68
13-15	10	58	78	92	18	65	78	85	-	-	-	-
Birth Weight:												
<1000 grams	-	-	-	-	55	50	48	62	38	40	55	48
1001-1250	-	-	-	-	40	58	55	58	35	37	40	45
1251-1500	-	-	-	-	50	55	78	85	58	50	58	62
1501-1750	-	-	-	-	20	42	50	78	20	50	62	62
1751-2000	-	-	-	-	10	55	55	70	22	48	68	70
2001-2250	-	-	-	-	15	50	58	70	38	38	68	72
>2251	15	58	80	88	-	-	-	-	-	-	-	-

Group 1: Referred for psychological testing: no meaningful or significant neurological findings.
Group 2: Sighted, premature: assumed to be a high risk group for minimal organic brain damage syndrome.
Group 3: Blind (RLF), premature.

*Since satiation is with the test curve, that is, the straight line, there is no illusion expected with Curve A. The figure in this column is the percent of trials in which the straight line after satiation is reported as curved.

severity of EEG abnormality is significantly correlated with the degree of disturbance on the satiation task.

Of the 55 children whose neurological exams were complete in terms of the schedule which we have devised, we rated degree of neurological disturbance from 0 through 4 on each of the neurological modalities of reflexes, cranial nerves, and motor functions, with a fourth score being the total of these three scores. There seemed not to be a relationship on the basis of any of the 0-to-4-point neurological scales or the total scale score. When the ratings were broken down into two groups--those with no positive neurological findings and those subjects whose ratings had been in groups 1 through 4--we did find a significant Chi-square ($p < .05$) such that the poorest satiation effects occurred in those subjects who were in the 1 to 5 neurological rating groups, and the best performance in those subjects in the 0 neurological rating group.

Forty RLF children between the ages of 9 and 13 were studied. The blind children had no difficulty in conceptualizing and comprehending the task. There seems a significant relationship between the degree of organic disturbance on the EEG and the failure to appreciate the illusionary phenomenon. There is a meaningful relationship between clinical neurological examination and perception of the illusion. Perception of the illusion is not a function of age or IQ. This appears a meaningful measure of an organic brain involvement in blind children. A group of sighted children matched in terms of IQ, chronological age, and birthweight produced precisely similar results. The inability to perceive the illusion is thus seen as a function of an organic brain disturbance and not a function of a visual impairment, *per se*.

A series of studies was carried out using the kinaesthetic after-affect phenomenon (see Figure 2). In this situation the youngster feels a rectangular block by moving the thumb and forefinger of the non-preferred hand along the long dimension of the block. With the preferred hand the individual estimates the size of the block by stopping at a point on a truncated triangular form equal to the size of the block felt by the other hand. The individual then satiates by rubbing a thinner or thicker block with the nonpreferred hand and reestimates the size of the original block. If the satiation has been with a thicker block, the original block will be reestimated as thinner than the original estimate; if the satiation block is thinner, the original block will be reestimated as thicker than the original estimate.

The same group of 40 RLF youngsters and their controls were tested on this kinaesthetic afteraffect procedure. The results rather neatly duplicate those observed in the study of satiation of straightness phenomenon. We would conclude, then, that tactual illusions are useful in studying the presence of organic brain damage in blind youngsters.

We are still faced with the question of whether, even with these additional tasks sensitive to an organic brain dysfunction, we can use a psychological test battery in making the diagnosis of a minimal organic brain damage syndrome irrespective of clinical or laboratory neurological evaluations. In many instances this organic disturbance will not be accompanied by a significantly abnormal EEG or clinical neurological evaluation. The answer seems to be "Yes," and an only slightly qualified Yes at that. A battery of psychological tests was administered to the 40 RLF children of whom we have already spoken: the verbal subtests of the Wechsler Intelligence Scale for Children; the tactual illusions and kinaesthetic aftereffect procedures; and the Dorfman Sentence Completion Test for children. Organic signs on the WISC were evaluated by observing the discrepancy between Vocabulary, Information, and Comprehension, on the one hand, and Similarities, Arithmetic, and Backward vs. Forward scores on the Digit Span subtests on the other hand. We have already reported an objective measure for ascertaining the presence of functional psychopathology on the Sentence Completion Test, based upon Berg's "discrepancy hypothesis" (the number of sentence items which the youngster completed with an unusual content). The presentation and scoring of the tactual and kinaesthetic tests have been noted. A total index of organic vs. nonorganic disturbances was made. This score correlated significantly with evaluations by the social worker of school adjustment, to ratings of hyperactivity and impulse control, and to factors of orientation to time and person so necessary in the overall organization and conceptualizations of the blind child.

Discussant: Charles C. Woodcock

My presentation will be made in three steps. First, I shall carry out my assignment, to tell what I think the implications are of what I have heard for the evaluation of blind children. I shall make a few additional comments which will undoubtedly reveal some of my ignorance. Then I shall give some impressions growing out of what I have heard. There will be a great deal of spill-over into the first and third from the second step.

What are the implications? About all I can say at this time is that there may be a few implications for a few blind children in a few situations, but at present I am not sure what they are.

Dr. Arbit takes the position that psychological tests are reliable indicators of minimal neurological disturbances or the minimal brain damage syndrome. This position is contrary to most of my thinking; however, I must admit that this is one of

the areas in which I am a dysfunctioning adult. That is to say, there is a void in my background and my experience in the area of psychological testing and the interpretation of test results. For these reasons--my contrary thinking, my lack of experience and my lack of knowledge concerning the use and interpretation of tests--I find the paper quite challenging as a start for new thinking in a new direction.

Few can argue with the term "dysfunctioning child." At least those of us who are without a broad background in the process of psychological evaluation are not evaluating children by means of frequently used tests. Teachers, parents, and lay observers make judgments regarding the child when they observe that he did not perform the task that was expected of him in the manner in which he was expected to perform it. He did not function, hence he was a dysfunctioning child. With care we can avoid saying he *is* a dysfunctioning child. If we do not allow ourselves to say that he is a dysfunctioning child, but rather refer to the specific task he failed to accomplish, and say he was a dysfunctioning child in that situation, we can prevent a lot of remedial problems. It is perhaps safe to say that many remedial situations are caused by labels; not that labels handicap the child, but I see labels as handicapping to the teacher's thinking about the ability of a child.

In studying Table 1 in Dr. Arbit's paper, one of the first things that caught my eye was the fact that, unlike Group 1, those with no meaningful or significant neurological findings who were referred for psychological testing, and Group 2, the sighted prematures assumed to be a high-risk group for minimal organic brain damage syndrome, Group 3, the blind RLF premature were, in addition to being far fewer in number, nonexistent in the age brackets of 5 to 7, 7 to 9, and 13 to 15. One would expect to find the RLF's to be missing from the younger age groups at this stage in time. The spread in IQ, which seems useful to the aims of this study (since, to quote Arbit, ". . . perception of the illusion is not a function of age or IQ. . .") did not puzzle me, but it causes me to question the application of not just this test, but all those we have discussed. Most of these tests are devised for a type of population that will not exist by the time the tests are ready for use, or else the children will have moved through the programs before we have any practical application for much of the material. So, I don't see where it will be applied in the future: our present population of blind children does not fit into this range. As simple a test as this is, the children I hear about and most of the ones we are working with at present, could not follow the simple directions or understand the simple vocabulary used in the directions, that is, . . . curve away. . . feel straight. . . opposite direction. And they are our population, the squeaking wheel that needs the grease now. However, in this test, as opposed to many psychological tests, it seems

the instructions to the individual being tested probably need not be as rigid as in some cases; and there are among the participants of this conference some who are making a case (and I think a good one) for less rigid rules in administering some of these other tests also.

If this test will in fact do what it is reported to do, and test what it is reported to test (and I have no reason to believe otherwise), then it will give us one more piece of information about a child. Then, if we program planners don't get what we want, we cannot blame the psychologists; we can only blame ourselves for not bothering them, not asking for interpretation, not asking for more meaningful definition, not asking for usable information, and just accepting the words or terms that are passed on to us. What this information ("organic brain dysfunction") means in terms of program is what we need to know now. If a sure-fire test were suddenly handed to us, and it showed conclusively that there is no organic brain damage in any of the children previously so diagnosed, what changes would we make in our program?

I would now like to move back for a few minutes, and read to you some of my notes from the meeting. Here, as an administrator, I need help. My task is to help teachers discover information they can use in formulating programs. Please translate for me into something useful for my teachers, what I heard here, among these the following terms and phrases: Consistency of relating, promising technique, minute correlation, interim solutions, self-directed, directed at self, individual differences, auditory stimuli, affective pull of stimulus, tactile stimuli, developmental patterns, moving patterns, complex modes, sensory modality, direct translation, therapeutic function, service purpose, research purpose, general purpose mobility aid, engineering question, psychological question, auditory display, visual prosthesis, post-hoc study, criterion groups, profile analysis, sampling behavior, etc., etc., etc., . . . If this is all I could bring home, they'd probably throw me out!

SUMMARY OF DISCUSSIONS

Test Construction or Adaptation for Use with Blind Adults

Very early in the discussion we were reminded of two matters which continued to generate resonances throughout the rest of the conference. The first was the demography of the blind; the second was the matter of norming of tests. It is possible to sketch the main concerns without developing every one of their implications.

So far as demography is concerned, we should always keep in mind that the term "the blind" is really a congeries of subgroups of persons who have some visual impairment. Important behavioral differences are found between those who are congenitally blind and those who become blind later in life (the so-called "adventitiously blinded"). There are also important behavioral differences among those with differing levels of vision. The so-called "legal definition" of blindness is in fact an administrative definition of the Social Security Administration; hence insistence on functional measures of visual impairment assumes unique importance.

The relevance of these distinctions to norming becomes evident when we consider tests designed to measure the behavior of visually impaired persons. The main difficulty is, of course, that most of the tests we have are normed for the sighted population, and make less and less sense to the evaluator when the variations in the blind population described are taken into account. In most cases, we can only say that we have compared how a visually impaired person performs on a test as compared with a sighted person whom he resembles in other respects (age, sex, etc.), not how he performs against himself, or against a population of other visually impaired persons. This fact becomes important, for example, in the case of blind children, whose learning task may consist of a process of learning, unlearning, and relearning of statements about the sighted world which must be transformed into the world of their own experience. This process is based on their own direct perceptions through the remaining senses, on what they learn of the perceptions of the sighted, and on an integration of these.

When tests are applied to persons in vocational rehabilitation programs, the lack of standards for the blind population is doubly felt, for an evaluator must judge the performance of an individual apart from the population against which his behavior is normed, and apart from the regnancy of his skill on a particular test in his hierarchy of abilities. Furthermore, the abilities tested may or may not be relevant to his work rehabilitation program. The implication here is that not only is insufficient attention paid to individual differences, but that indeed the goal of maximum human functioning is systematically frustrated

by the fractionating of abilities out of the functioning whole in the customary testing procedure. After all, most tests provide only a snapshot in time of a performance of an individual, a performance which may or may not be relevant to other life tasks, or to other times in the life cycle.

The basic difference between researchers and practitioners in evaluating the blind can be caricaturized in the following way: the practitioner sees little or no relevance of tests to the reality of the life situation of their clients, while the researcher feels that the insistence of practitioners on the "whole person" gives one very little increment over actuarial predictions of performance over time. The resolution of this difference does not appear to be to discard the potential value of tests, or to ignore the life situation of clients. Part of the answer may be to maintain a clear distinction between the dual roles of the researcher as he functions in his role of scientist, and as he functions in his role as clinician. In the first instance, the researcher is trying to identify variables in such a way that he can generate conceptual tools that are, in the happy phrasing of one participant, ". . . exportable outside of his idiosyncratic setting." As a clinician he is under no such constraint; but it is at this point that he confronts the question of the validity of test results to the life experience of the person being tested. The greatest value of the practitioner, in this case, is his insistence that more account be taken of the relevance of test results to the life experience of his clients.

The difficulties in resolving these questions of relevance for the life situation of the client, and the use of client populations to evolve scientifically respectable test instruments, may be in part responsible for the tendency for some researchers to appear with new and sensitive test instruments, and then disappear after the first abortive attempts to use the instrument in the field. Evidently, when practitioners talk to the researcher they address themselves sometimes to the scientist, at other times to the clinician; the conflicting demands on the researcher appear to dampen quickly his effectiveness in applying test instruments in those situations in which he is invited to validate his instrument at the same time as he is expected to give "useful" answers to "real" problems faced by the subject or client.

We can anticipate one resolution of these difficulties later in these remarks by saying that it is evident that the researcher cannot be effective in his role either as scientist or as clinician unless he maintains continuity over time as part of an evaluation unit, in cooperation with practitioners. Without this continuous intervention--and the continuous sampling of clients' behaviors that it implies--tests tend to acquire an absolute value, with unintended consequences for the person tested, consequences perhaps not even relevant to his capabilities or his needs.

Having practiced drawing the lines of responsibility among the researcher, the clinician, the practitioner, and the person tested in the first discussion, the participants fastened quite quickly on the two different ways of looking at the assessment procedure suggested by the Palacios: from the point of view of its use with clients in a service context--which was not the concern of the paper--or as a formal set of instruments for use in further work, whether normative, research, or clinical. What the Palacios have presented is the result of a researcher's look at the variables they have selected; whether that procedure is used by practitioners or not is not their immediate responsibility.

The question was quickly posed: For whom are we developing the information that the test battery and interpretive schedules will deliver? Even biographical data can be used in different ways: as a routine dossier input, or as a starting point for the tested person's own creative assessment of the patterning of his life style, and so on. In the latter case, the client could regard the biographical form as an assessment to which he adds as time goes on. But we must guard against being critical of tests for reasons they are not designed to consider. Thus, this set of tests is a post hoc descriptive study of a large group of blind adults, with the goal of attempting to relate a number of biographical and test functions to the vocational attainments of the group. The question then becomes: What is the predictive value of the test battery? Of course, no attempt at an answer is possible until a stable measuring instrument has been developed; this test was an initial step in that direction, and not the end result of a series of such steps.

Perhaps there is a need to break out of present constrictions and to look at some new and possibly more meaningful variables--to ask in what ways we can look at what we could learn about those things we don't know, rather than for finer, more numerous, and more minute correlations about those we do know. Might this be the source of the practitioner's prodding of the researcher? Research along established lines has not reached full development so the relevance of the multiple correlations we have to use is questionable in part because we have no better tests; researchers drop out before their instrumentation is perfected; a criterion coefficient appropriate to one situation may be a very poor fit to another situation; and so on. It must be recognized that unless there is adherence to the rules of the scientist in constructing stable measuring instruments, we shall not have the opportunity, ever, to establish criterion coefficients relevant to the practitioner's needs. This, then, is the purpose of the assessment of personality dynamics and vocational adjustment.

In sum, the practitioners were impatient with scientists for coming forward before their instruments were ready for

practical use; while the scientists were impatient with the practitioners for having expectations of the instruments that they were not developed enough to fulfill.

Factors Related to the Utilization of Sensory Aids

It is clear that the importance of the two criteria pointed out by Dr. Bliss for evaluating a sensory aid was not lost on the participants. One interesting application of these criteria has been made to the question: Why did the optophone type of reading aid not achieve the success so many thought it should? The answer appears to be that the optophone type of aid does not provide sufficient resolution at its input that one could recover the ink print analogue at the output of the device. This question has been examined in some detail in a recent paper by Bliss, to be published soon in the IEEE Transactions on Man-Machine Systems.

It was also clear that the fate of a sensory aid which meets these two fundamental criteria (of providing sufficient input to the user, and of providing input which he can use), may be compromised by the lack of a systematic examination of the role the device or device system may play in a larger context. Thus, in asking why the braille system of coding does not enjoy more widespread use--since it meets the two criteria already mentioned--we discover that there is some difficulty in getting ink print into braille in the first place. This system consideration is what limits its potential appeal not its lack as a communication code.

These criteria hold for basic and applied research and development of sensory aids across a wide sprectrum of users; they also must be applied seriatim, that is, one must meet each criterion in turn. Thus, the blame for the poor showing of the optophone as a reading aid is often laid at the door of psychological difficulties in understanding the output of the device; but this locus of difficulty cannot be fixed without answering the prior question of the adequacy of resolution of input. The importance of an adequate understanding of the system design of an aid can be seen in the fate to date of relatively elaborate effort devoted to the development of electrocutaneous and tactile code systems; although they seem to meet the first two criteria for resolution and intelligibility, they have not yet been anchored in a system which makes use of them. Hence, they have had no use trial that is, as yet, meaningful in terms of application to the communication problems of impaired persons.

The use of market surveys to assess user interest in products has not been shown to be a useful way of finding out what users want and need; the celebrated case of judging the public's reaction to color television was introduced to remind us of this fact. Yet, in terms of reading aids--and the discussion centered largely on these--there seem to be a few points of consensus

among researchers and potential users. The first is the need of an interactive mode, so that the user has control of the speed of reading, on scanning capability, and of going back over material read. The second is that any sophisticated reading system or service will succeed to the extent that it provides access to materials otherwise not readily available.

In addition, there was agreement that experiments which utilize vision as a modality to test adequacy of system design, or which use the most sensitive and skilled blind users to hear and touch output displays, are justified on the ground that if the system does not satisfy the most "forgiving" sense channel, or the most "forgiving" set of users, then it is not likely to succeed under conditions of greater restraint of resolution or intelligibility. This point has caused some confusion among practitioners, who do not understand that researchers thus need the most discriminating and experienced of blind users to help evaluate reading and mobility systems. This confusion is reinforced by the fact that the least interesting path through the whole research and development process is a straight line: the numerous points of feedback from the user give us the most meaningful information about the adequacy of a machine design. The most apposite analogy here is with the use of a skilled test pilot for evaluating a new airplane; if he can use it, and can help remedy its flight weaknesses, then the presumption is that it can be handled by commercial pilots with reasonable safety; in a similar way, we can determine the upper limit of usefulness of a sensory device by using the most capable blind persons available. It is understood, of course, that eventually the degree to which a device or system is used will depend in large part on the skill with which the capabilities of the device or system are matched to the demography of blind users. And we know that the majority of blind users of any reading or mobility system are over 60 years of age, have often more than a single impairment, and have low motivation to use sensory aids. The greatest likelihood of success is to be found in a range of options of sensory aids of a range of capabilities, matched to subpopulations of blind users who have capabilities matching the available aids. If we can reach this stage, we can look forward to an alleviation of the disparity between researcher and practitioner--the former looking for results with the most gifted blind, the latter looking for results with the most impaired.

Intelligence Testing and the Implications for Evaluation of Blind Children

The brief discussion of these papers outlined some of the procedural techniques in development of scores for almost any tests of "product" or "process." What is clearly involved is some conceptual schema which identifies unambiguously the elements involved and a sound measure of these elements. With this as a starting point attempts can be made through psychometric procedures to explore the trade-offs among combinations of elements and other variables, such as criterion groups and predictors.

What often happens is that in the development of schema, and of ways of utilizing psychometric procedures to explore the interaction between independent variables and combinations of elements of the conceptual schema (i.e., the dependent variables), the interest of investigators becomes arrested at the "global" level (it was this tendency in the field that Newland deplored particularly). This may be allied also with a concentration on product rather than process. If we remember, however, that high correlations are easy to obtain for global measures in large populations, we can be more cautious about their interpretation; the false inference that global scores lie along a single dimension is a temptation many find hard to resist, especially when they must make administrative decisions about the capabilities of children.

It is, of course, not the case that global scores lie along a single dimension. We have seen in the work of Lukoff and Whiteman, and of Siller, that it is possible to develop a whole series of scales, and measures of scales, which are tied into relevant and real dimensions; at least the measures are relevant and real in terms of the factor analytic procedures used. The main point is that psychological and psychometric analyses are not contradictory, but complementary; and that the research process during which the latter are employed is not appropriate to making administrative decisions (they may be appropriate critically to making decisions in psychological theory). What is required to make both psychological and psychometric analyses useful and relevant to the administrator is a further step, which so far has not been taken: namely the establishment of meaningful relationships among scale measures, inferences about the dimensions that scales measure, and the learning capabilities of children who are tested. This is a research problem of the first order of importance.

A thorny issue which was raised but not resolved, and should at least be mentioned here, was the extent to which values may underpin the norms of test measures. Although undoubtedly more a sociological issue than a psychological issue, it is important in the case in which the culturally disadvantaged child is tested, especially when the scale measure lies rather closer to the

product than to the process end of the psychological dimension.

Assessment of the Nontestable Blind Child

Here we are dealing with a subpopulation of blind children. Most of these children have been tested at one or another time, but proved to be difficult to interpret by the less than consummately skilled analyst; of these, about 10 percent represent really difficult problems of interpretation. Because these children are so difficult to test, and may indeed have to be referred even among the most skilled analysts, a great deal of time is spent on them. The question was nevertheless raised here, as it was raised about testing blind adults, whether we are profligate with our testing; whether it might not be possible to compress the evaluative process by determining that point of diminishing returns in evaluation at which no further specification of useful rehabilitative or educational alternatives can be obtained.

One of the difficulties in answering this kind of question is that there exist no data which indicate where that transition point lies. On the contrary, all we have now are indications that we know so little about evaluating really difficult children that we are only justified in spending as much time in assessing their life chances as we can possibly afford; and that this implies relatively frequent reevaluation. The limits of these efforts seem to be set more by extrapsychological constraints than by the interest of the clinician. Among these constraints are the role that the psychologist/clinician plays as the mediator between the difficult behavioral problems of the child and the assessing of realistic goals for him and the parents; the variety and adaptability of the programs available locally into which the child can be fitted; the very high ratio of teachers to children required for any of these programs to work minimally well; the implied resources which society is willing and able to put at the disposal of those who wish to carry out the virtually one-to-one child/teacher education process; and, correlatively, the resources which society is willing to devote to more than a one-sample assessment of the child.

Some useful indications of potentiality even for difficult children (and by implication, for the less difficult) is in the behavior of babies--an area largely neglected. It is here that some important clues to the functioning of the child can be inferred. Among the areas in which clues may be found are (1) the alternative modes of communication between mother and child, i.e., tactile and kinesthetic communication, when vision is impaired (as in the work of Pfanz); (2) the ability of a child to orient to sound, since sighted babies turn toward a sound early on, while blind babies do not; (3) the

seeking for environmental support, since sighted babies will put out a hand for support when rocked to either side, while blind babies will not; (4) the extension of interest in exploring space around him that the baby displays, since this may be a measure of the developmental progress of the very young child. We have good reason to believe that these early tendencies toward development, or lack of it, persist for some time; but aside from Fraiberg's work in Michigan, little seems to have been done to promote the exploration of space by the impaired child as one aid in developing an interaction with his environment which reduces the later differences between the normal and the impaired.

In the evaluation of these very difficult children, we are perhaps more than usually in the position of providing temporary solutions to permanent problems, as Sullivan has pointed out. All we can say is that we know that the tests we use systematically underestimate the potential performance of many children; and that we can turn to profit the observation that there are certain conditions under which a "best performance" can be obtained in sampling a child's behavior. In view of these inferences, there is a need to append a time limit on predictions of behavior from the tests we have, to become particularly sensitive to the operational definitions of the variables we predict with, and to remain alert to and aware of the purpose for which a prediction of behavior is made, i.e., what it is planned to do with the child, and the practical implications of the prediction. It is in this last area we confront, again, the need to think through the value underpinning of the purpose we intend in making assessments and predictions.

Here, more than in almost any other session of the conference, one felt that we could rename our cooperative effort as New Approaches to a Conference on the Evaluation of Blind Persons.

Evaluation of Minimally Brain Damaged Children and the Characteristics of Brain Waves in Blindness

Papers dealing with these two areas of work were contiguous; they were also largely congruous in terms of the discussions they provoked. The substantive content of the discussions in both areas can be found in an extended discussion of neurological fundamentals in Dr. Parmalee's remarks, and in the additional comment from Dr. Lairy. The remainder concerns principally our old friend, the relationship between specialist and practitioner, and we can therefore continue that commentary as if we were uninterrupted.

By now, it should be well known that the EEG record cannot be used as a single diagnostic tool which demarcates reliably between the visually impaired and the brain damaged and mentally retarded blind. The evidence on this matter has been accumulating

for some years, and dates back at least to 1962 and the work of Kellaway in Texas, Cohen in Illinois, Grey Walter in Bristol, Parmalee in Los Angeles, and Lairy in Paris. It is all the more distressing, therefore, to discover that the EEG, like other psychological measures, is interpreted by the nonspecialist or uninformed specialist without consideration of other behavioral and psychological characteristics, without regard for the referent of the record, after a single examination, and apart from other persons skilled in evaluation. What is even more distressing is that the result can be so devastating to a child, who is thereby labeled as ineducable, irretrievable, and irremediable. Some of us have seen these children, in state institutions, under custodial care only, living out a life which is only a preparation for an early death--typically around age 30.

The process of labeling did in fact come under examination, because of the dangers involved--even for the specialist who sees a child only once for a neurological evaluation. One way of getting around labeling is to provide a detailed report of the behaviors observed and their apparent function for the individual being examined; only then should a diagnostic label be applied, by way of summary. The logic is simple: if one describes the behaviors of autism in a particular child, a means of treatment may be encouraged by observing the points at which intervention might be useful; if the child is merely labeled as autistic, his problem may simply be abandoned.

The principle can be applied with even greater force to the notion of "organicity," and of brain damage. Our state of knowledge about the brain is indeed insufficient to provide us with anything suggesting treatment, methods of management, or the like on the basis of a diagnosis of organic brain damage. Aside from differentiating a syndrome different from those of other organ systems it has little to offer. "Organicity" means little or nothing to the neurophysiologist, because he can't tell where or what in the brain is involved in specific items of behavior. If a concentration is made instead on the ways in which the individual responds to functional tasks, it may be somewhat easier to conceptualize him as learning or functioning in deviant ways. This approach implies means of dealing with the deviant learning in a way which a diagnosis of "organicity" does not.

For reasons similar to these, the use of an EEG for diagnostic purposes with a blind person is possible, but only when used with extreme caution, in conjunction with much other data, and only by a specialist fully cognizant of the special characteristics of the EEG of blind persons. There are of course differences in the character of EEG records for many populations; there is no "ideal brain" from which an "ideal EEG" may be expected. Rather, there are records characteristic of the elderly, of individual differences that are nonpathological, and of the

singly impaired, like the blind. There are even differences between the totally blind and the several levels of visual impairment; in the case of very low remaining vision, there is for example a higher incidence of occipital spikes. (These might be interpreted as irritative discharges representing a response to perception insufficient to interpret the visual input.) Perhaps this might be regarded as yet another way of saying that the population of persons called "blind," even by the so-called "legal" or economic definition is not homogeneous, and cannot be studied effectively as if it were homogeneous.

The many cases of malpractice in disposition of cases of singly impaired children through improper use of an EEG record brings into particularly sharp relief some of the problems we have already sketched in earlier sections. The isolation of practitioners in the field of work for the blind has many consequences, not the least of which is the steady attrition of first-rate professionals from the field, and the inability of the field to make contact on a continuing basis with specialists. Surely with so delicate a matter as the interpretation of neurological data, one would expect as a minimum the continuous involvement of the medical specialist with an evaluation group dealing with a child over a period of time. Yet specialists are often still regarded as "outsiders," and they are thereby denied the overview of the child and the role of his (one-time) findings on the evaluation of the child's capabilities. His language is not the language of practitioners, hence there is a problem merely in his communicating his findings in the proper perspective. And the specialist is also often unacquainted with blindness, and not aware that syndromes which correspond to no classical type may be a matter of function.

Conclusion

A recurrent theme of this meeting was the failure of the field to achieve an integration of research and practice so as to optimize human functioning in the case of sensory impairment--or even to assess the degree of that impairment and its influence on the functional capability of the individual. To the extent that this integration is lacking, to the extent that research is comparmentalized and excluded from the process of evaluation, to the extent that the world of the practitioner remains isolated from what the researcher has to say about evaluation--to this extent a conference like this must fail in one of its most important purposes. If this integration existed, and if the participation of researchers in evaluation were a continuous function, we might better address ourselves to a workshop or seminar to discuss improving our methods.

What has caused this state of affairs, and what can be done about it? Can the next ten years show an improvement in psychological testing and measurement of the sensorily impaired that the last ten years has failed to turn up?

I should like to suggest that one of the reasons for the gulf separating the researcher from the practitioner in this field is the dual role that researchers are expected to play, and the lack of support he finds in either. The roles are those of the scientist, on the one hand, and of the clinician, on the other. As a scientist, his conduct is to a large extent bound by rules of the methods, the commitments, and the skills pertinent to the pursuit of psychology as a science; these rules do not intersect meaningfully with the world of the practitioner except at few and tangential points. Even as a clinician, his role is relevant only to the extent that he becomes part of an evaluation team functioning over time, taking continuous samplings of behavior, and taking into account the life problems of the persons evaluated. An immediate inference is that the weakest link in communication is likely to be between the scientist and the practitioner, since it is likely also to be one-way. Another inference is that greater hope must be placed on the combination role of researcher/clinician as the only realistic representative of a middle ground between scientist and practitioner. But to get the involvement of a first-rate professional implies that he be paid well and that he is assured of continuity in his involvement. The salary he receives may then make up in part for the decrement in prestige he may feel in engaging in the practitioner's world, while the assurance of his continuity will ensure his effectiveness over time.

This continuous involvement of the researcher/clinician may help to alleviate one of the most vicious and one of the most frustrating misuses of psychological tests, namely, the tendency to use test results as an inviolate and definitive measure of what an impaired individual can do. His role here will be to correct continuously the commonest misunderstandings of the nature of a psychological measure. It will at the same time abort the easy assimilation of what a child can "do" to the role-assigning behavior we all engage in when assessing what any individual can do--for what we can *do* implies in large measure what we *are* and what we are capable of doing in the future. With continuous monitoring of interpretation of psychological test measures, something can be done to avoid the sheer mechanization of evaluation now prevalent, and about which many protest. The worst result of a mechanical interpretation of test results is the generation of an atmosphere in which evaluation is done for the sake of evaluation not for the sake of the person evaluated. In the case of blindness, it leads eventually to viewing blindness as a technical disability rather than a profound impairment with profound human implications, and this makes us all less human.

The researcher as scientist is engaged in a process that Graham and I have discussed at length elsewhere.* He should be encouraged to continue his involvement in test construction, development, and verification, unhampered by the questions of applicability to immediate problems with which he is not equipped to deal. Certainly one of the most frequent complaints heard at this conference was the lack of continuous research effort--not application, but fundamental knowledge about test construction and development. The opportunities are rich enough for the engagement of a scientist's interest and abilities with real problems to which his peculiar skills are most appropriate--rich enough to keep him quite busy with what he knows best.

For the immediate future, so far as practice is concerned, one of the most intriguing prospects is for the further examination and development of the "best practice" examples for the multiply impaired and "noneducable" child and adult. The two that come most readily to mind are the Oregon State School for the Blind, and the work of Dr. Elonen and her colleagues. From the point of view of coping with the population of the severely impaired, the only reasonable conclusion of a cost/benefit analysis of present funds vs. present capabilities is that much wider application of these successful solutions of the problem of optimizing human functioning with the severely impaired should be encouraged.

Also for the immediate future, if we can envisage that as including the most widespread use of the evaluation team of specialists (including both the researcher/clinician and the practitioners), there is an equally large challenge in the options now before us. Among these we can include the examination of the potentiality of the traveling evaluation, which is used to guide only the next step an individual takes, not to determine his whole course of travel; the use of evaluation for aiding the tested individual to evaluate his own behavior; the increasing use of computers for real-time processing of information, so that we can evaluate the information we receive as the behavior is going on; the more rapid dissemination of information about evaluation, so that workshops can become common; and so on.

The length and the density of information in this proceedings volume attests to the profound concern of all the participants with all of the matters just discussed, and with their struggles to find solutions in their individual environments. Surely one of the most useful results of this conference was to illuminate these problems and, more importantly, to illuminate how the several problems were, and are, interrelated. To have

*Milton D. Graham and Leslie L. Clark, "Trends of the Research and Development Process on the Sensorily Impaired: Europe and the U.S.A. 1966," Research Bulletin No. 14, American Foundation for the Blind, March, 1967, pp. 1-30.

raised problems and not to have answered them is often cited with pride in proceedings one sees nowadays; but the fact that we not only raised problems but took considerable pains to suggest some answers, with anguish in so doing, is an achievement of which the participants should well feel proud.

APPENDIX I: Letter from Kathryn E. Maxfield

Since Dr. Maxfield, one of the invitees, was unable to attend the conference, the conference coordinator asked her if she would be willing to comment on the papers in writing. Following are her comments.

Kathryn E. Maxfield, Ph.D.
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July 2, 1968

Miss Zofja S. Jastrzembska
Assistant Director
American Foundation for the Blind
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Dear Miss Jastrzembska:

Thank you for asking me to add my own comments to the papers and discussions of the Conference on "New Approaches to the Evaluation of Blind Persons."

My first reading of the invited papers brought a sense of long-time familiarity which lasted until I reached the brain waves! At that point I no longer felt at home because of my limited knowledge of that field and of minimal brain damage syndromes. The papers are of such high quality that commenting on them is difficult for one who was not present during what must have been stimulating discussions. Consequently, what follows represents my own thinking which may or may not be relevant.

My first contact with the testing of blind people was when I learned American Braille during my college years in order to interline the braille test papers that were the results of Samuel P. Hayes' pioneer work in adapting educational and intelligence tests.

Carl Davis's report gives a brief but good review of the work on intelligence tests during those early years.

Although I cannot speak for other early experimenters, I do know that Robert B. Irwin and Samuel Hayes were fully aware that any test prepared at that time could not make adequate allowance for fundamental differences in sensory intake which might affect intellectual configurations and therefore the behavioral output of blind testees. On the other hand, they did realize that, from the practical point of view, a blind or low-visioned child must be able

to make the same or very similar responses to life situations as would a seeing child. Consequently, as few changes as possible were made in the structure of individual test items even though experience with those items might alter their placement on the test scale. New items were evolved in terms of the consistency with which they evoked responses such as those brought forth by the original items. This was the only feasible approach at the time. Even though the tests might have limitations their use was essential as instruments of investigation which could eventually lead to deeper insights into the mental and emotional lives of people with differing degrees and types of blindness.

All the papers for the Conference, including the background papers, have one thing in common. They all recognize, implicitly, the existence of similarities in behavioral output between the blind and the seeing while at the same time they are placing emphasis on differences. After all without differences in human personalities, what a drab world this would be!

Doctors Malikin and Freedman, and Dr. Hallenbeck, stress the importance of recognizing the differences in comprehension which may exist between blind and seeing persons resulting from differences in informational intake. Dr. Hallenbeck comments that rehabilitation counselors usually see their clients in terms of economics "because their goal is the return of a client to a useful position relative to the economy." The emphasis in this orientation is quite different from that of clinical psychologists who are connected with rehabilitation programs. The former use tests for help in deciding whether a blind client can carry out a specific work performance as efficiently as would a seeing worker. The psychologist will probably be seeing him because of questions regarding his personality and behavioral characteristics; and tests are chosen accordingly. The differences in avenues of perception between blind and seeing people will be considered by him because of the significant role which they play with respect to the client's on-the-job behavior.

A question occurs to me for which everybody else may already have the answer. How many graduate courses are there relating to the functioning of blind people from which seeing evaluators can gain some little insight into the problems facing blind people who must live effectively in a world where primary emphasis is placed on integration of sensory experience through vision? Are there any courses in which the considerable frequency of identity in sensory responses to stimuli is given due emphasis? The seeing do, after all, have frequent occasion to use the auditory, the olfactory, the vibratory sense as the integrative sense.

Just what do we mean when we speak of blind people? We may classify them in terms of total blindness, light perception, or less than 20/200 vision. We also speak of the congenitally blind and the adventitiously blind. We realize that those who have seen longest probably have the best visual recall. However, it has seemed to me the idiosyncrasies in vision, other than degree, have

not been given the attention they need in terms of learning skills, educationally and vocationally. Many of these idiosyncrasies can have a definite effect on personality pattern if only because of the frustrations they induce. I am speaking of idiosyncrasies such as double vision; upward but not downward vision; peripheral without central vision; variations in shape, distance and even color perception between the images obtained by the two eyes. How much experimental work, recent or otherwise, has taken into account the effect of such idiosyncrasies upon a visually handicapped person in his attempts at adjustment to his environment? I may be wrong but it is my firm impression that there has been little if any research along these lines. Yet, think of the effect on a visually limited individual's personality when he has to adjust to additional distortions of the visual world along with those imposed by his limited concepts of distance.

In her paper on the "Assessment of the Nontestable Blind," Dr. Elonen is discussing children who can be gravely misunderstood if their abilities are assessed by evaluators who have not become sensitive to the need for careful clinical study of each child. As she says, there has been a tendency to "accept things at face value and, therefore, to greatly underestimate thepotential capacities which can be proven to exist by subsequent training and therapy." Sometimes, with these children, tests which are use empathically and thoughtfully, without undue orthodoxy, can be valuable as diagnostic instruments even when no regular scoring is attempted.

Through their development of the Sound Test the Palacios seemed to me to have found a valuable method of checking on a blind adult's personality characteristics in terms of what may be for him basic approaches to concept formation.

The results of a previous study of theirs "indicate the superiority of human and mechanical interaction sound segments over (a) human sound alone and (b) mechanical sound alone." (p. 10) (Would not this same superiority be found also for fully seeing people?) This is an important conclusion when it comes to placement in many kinds of jobs.

From the little that Doctors Malikin and Freedman say about the projective technique now being devised by Lawrence Miller of the New York Association of the Blind, it seems probable that there will be another valuable means of getting more directly in touch with the personality dynamics of visually handicapped people who have limited or no visual experience. The fact that the Miller approach is through tactual-kinesthetic perception will enlarge the very limited number of present-day projective techniques for use with the visually handicapped.

Dr. White puts emphasis on needs which are shared by blind and seeing people. This is true with respect to mobility, I feel sure. Those of us who are fully seeing are so bound to the use of vision as a chief perceptual and integrative aid that we are not conscious of how dependent we are on our other senses

integratively speaking. All of us have lived through times when our almost compulsive dependence on visual imagery has interfered with our ability to find our way through the use of other sensory aids.

When it comes to reading needs Dr. White has touched upon the basic urgent need for some device which will facilitate the discovery of reading matter that is needed within a reasonable length of time by all academicians and researchers whether blind or seeing. His idea of using blind readers as guinea pigs for the testing and evaluation of automated libraries is unique, has a point, probably is also practical. Are there not a number of blind engineers and scientists who can be especially valuable as original thinkers regarding such a scheme?

The concern of Doctors Arbit and Cohen with children of minimal brain damage and with atypical EEG patterns in blind premature is revealing. The fact that patterns are different for prematures, especially for the RLF children, would seem to indicate a difference in organization of function within the brain. Both authors are reassuringly cautious in interpreting their data. As Dr. Cohen says, "the important result is that a child be not labeled as an epileptic brain damaged child solely on the basis of an abnormal (by sighted standards) EEG record."

The tests shown in the Arbit paper are intriguing. I wonder what difference there would be between these tests and corresponding ones which were devised by blind psychologists for use with the seeing.

Doctors Arbit and Cohen are experimenting at the basic neurophysiological level about which much more needs to be discovered, with respect to blindness, than is now known.

This letter has turned into a long series of comments and assertions which are strictly Maxfield in nature. Please feel free to write me about reduction in length and clarification of content; or, please feel very free to omit the use of any of it. I am sorry to have taken so long in getting it to you.

Sincerely yours,

Kathryn E. Maxfield

KEM:al

APPENDIX II: Background Material

The following papers were provided to participants prior to the Conference as background material:

Curtis, W. Scott. "The Evaluation of Verbal Performance in Multiply-Handicapped Blind Children," *Research Bulletin*, 11:81-91 (October, 1965). (also in *Exceptional Children*, 32 (6):367-374 (February, 1966).

Dauterman, William L., Bernice Shapiro, and Richard M. Suinn. "Performance Tests of Intelligence for the Blind Reviewed," *The International Journal for the Education of the Blind*, 17(1):8-16 (October, 1967).

Graham, Milton D. "Multiply Impaired Children: An Experimental Severity Rating Scale," *The New Outlook*, 62(3):73-81 (March, 1968).

Kenyon, Eunice L. *Diagnostic Appraisal at the Boston Center for Blind Children*. Paper presented at the International Conference of Educators of Blind Youth at Perkins School for the Blind, Watertown, Mass., August 21-27, 1967.

Lebo, Dell and Roselyn S. Bruce. "Projective Methods Recommended for Use with the Blind," *Journal of Psychology*, 50:15-38 (1960). (also in *Research Bulletin*, 1:41-57 (January, 1962).

Matlin, Norman and Herbert Marty Torres. *The Emotional Factors Inventory as a Normative Instrument*. Unpublished paper. Puerto Rico: Instituto Psicologico de Puerto Rico. 1967.

AGENDA

CONFERENCE ON NEW APPROACHES TO THE EVALUATION OF BLIND PERSONS

SPONSORED BY

THE AMERICAN FOUNDATION FOR THE BLIND

St. Moritz Hotel, New York, N.Y.
April 11 and 12, 1968

Thursday, April 11

Morning

Chairman:	Herbert Rusalem
Invited Address:	"Test Construction or Adaptation for Use with Blind Adults"; summary of prepared paper: David Malikin and Saul Freedman
Discussant:	Implications for the Evaluation of Blind Adults: Simon Hoffman
Group Discussion:	Simon Hoffman, Chairman
Invited Address:	"Personality Dynamics and Vocational Success of Blind Adults"; summary of prepared paper: May Husni-Palacios and John Palacios
Discussant:	Implications for the Evaluation of Blind Adults: Martin Dishart
Group Discussion:	Martin Dishart, Chairman
Presentation:	"Perceived Pleasantness: A Stimulus Variable in Auditory Projective Testing": Ilana Breger

Afternoon

Invited Address:	"Psychological Factors in the Evaluation of Sensory Aids"; summary of prepared paper: Benjamin W. White
Discussant:	Implications for the Evaluation of Blind Adults: James C. Bliss
Group Discussion:	James C. Bliss, Chairman

Invited Address:	"Some Issues Concerning the Use of Standard Personality Tests with the Blind"; summary of prepared paper: Phyllis N. Hallenbeck
Discussant:	Implications for the Evaluation of Blind Adults: Warren M. Brodey
Group Discussion:	Warren M. Brodey, Chairman
Chairman:	Summary of the Day's Program: Herbert Rusalem
Film:	Work with Multiply-Handicapped Children at the Oregon State School for the Blind--through the courtesy of Charles Woodcock

April 12, 1968

Morning

Invited Address:	"New Developments in Intelligence Testing of Blind Children"; summary of prepared paper: Carl J. Davis
Discussant:	Implications for the Evaluation of Blind Children: T. Ernest Newland
Group Discussion:	T. Ernest Newland, Chairman
Invited Address:	"Assessment of the Nontestable Blind Child"; summary of prepared paper: Anna S. Elonen
Discussant:	Implications for the Evaluation of Blind Children: Bluma Weiner
Group Discussion:	Bluma Weiner, Chairman

Afternoon

Invited Address:	"Evaluation of the Minimal Brain Damage Syndrome in Blind Children"; summary of prepared paper: Jack Arbit
Discussant:	Implications for the Evaluation of Blind Children: Charles C. Woodcock
Group Discussion:	Charles C. Woodcock, Chairman

Invited Address:	"Brain Waves and Blindness"; summary of prepared paper: Jerome Cohen
Discussant:	Implications for the Evaluation of Blind Children: Arthur H. Parmelee, Jr.
Group Discussion:	Arthur H. Parmelee, Jr., Chairman
Chairman:	Summary of the Day's Program: Herbert Rusalem

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